

SCIENCE

VOL. 93

FRIDAY, MAY 23, 1941

No. 2421

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SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa.

Garrison, N. Y.

New York City: Grand Central Terminal

Annual Subscription, \$6.00

Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PRELIMINARY ANNOUNCEMENT OF THE DURHAM, N. H., MEETING

By Dr. F. R. MOULTON

PERMANENT SECRETARY

FROM June 23 to June 28, inclusive, the association will hold at Durham, N. H., the first of its two meetings this summer. The Durham meeting will be held in connection with the celebration of the seventy-fifth anniversary of the founding of the University of New Hampshire. The Chicago meeting, from September 22 to September 27, will be held in connection with the celebration of the fiftieth anniversary of the founding of the University of Chicago. These meetings suggest the question whether the association might not advantageously hold its summer meetings often in connection with special celebrations of scientific and cultural institutions and organizations.

Only once before since its founding ninety-three

years ago has the association met in New Hampshire. On the invitation of Dartmouth College, a summer meeting was held at Hanover, N. H., from June 29 to July 3, 1908. At that time the membership of the association was about 5,500; it now exceeds 21,000. Only 25 scientific papers were presented at the Hanover meeting, 16 in physics and nine in geology, in addition to two public addresses, one on "The Spoilation of Niagara," by Professor J. W. Spencer, and the other on "The American Bison," by Mr. T. S. Palmer. At the coming meeting at least 35 sessions will be held for the presentation of scientific papers in addition to a considerable number of field trips by the geologists, the botanical societies, the meteorologists and the

foresters. At least 26 sections and societies will participate in the meeting. The world of science moves rapidly forward in spite of wars and rumors of wars.

DURHAM, N. H.

Durham, at which the meeting will be held, is an attractive New England university town in the southeastern part of New Hampshire only 15 miles from the Atlantic coast and 62 miles from Boston, from which it may be reached by the Boston and Maine Railroad. It is accessible from every direction by excellent roads. Portsmouth, only 12 miles away on a land-locked harbor, is one of our principal naval bases on the North Atlantic coast. From Portsmouth a ferry may be taken to the University Marine Laboratory on Appledore Island, one of the Isles of Shoals which were discovered by Champlain in 1605. Within a few hours' drive of Durham to the northwest are hundreds of beautiful lakes, the largest of which, Lake Winnepesaukee, is noted for its 274 green islands. Beyond are the White Mountains and famous Mt. Washington in the Presidential Range. Durham lies peacefully in a gently rolling country, much of which is wooded. Great Bay, an almost completely land-locked tidal basin, is only a few miles distant and tide-water, backing up a stream, reaches the border of the town.

THE UNIVERSITY OF NEW HAMPSHIRE

In 1856, Benjamin Thompson, a farmer of Durham, left all his property to the people of New Hampshire to establish a college of agriculture on the land he had owned. The university began as a department of Dartmouth College in 1866, only nine years after the dedication of the Michigan Agricultural College (now Michigan State College of Agriculture and Applied Science), the first college of agriculture to be established in the United States. The University of New Hampshire was removed from Hanover to its present site at Durham in 1891. It has been expanded until it now consists of the College of Agriculture, the College of Liberal Arts, the College of Technology, and their numerous departments, and the Graduate School. It has a faculty of nearly 200 of the grade of instructor and higher and more than 2,000 regularly enrolled students.

As a part of its celebration the university has organized a ten-day series of programs for the period June 17 to June 26 on "The Welfare of New Hampshire." The programs for the first four days are on the following general subjects, all pertaining especially to New Hampshire: "The Home," "The Nearby Community," "The Larger Community—the State," "Our Social Controls," and "Labor and Industrial Relations." Beginning with Monday, June 23, the program of the

university will run concurrently with that of the association.

The title for the program for Monday, June 23, is "Our Underlying Resources." The morning session will consist of papers on "New Hampshire Surveys its Natural Resources"; the afternoon session, a paper on "Economic Aspects of Conservation."

The title of the program for June 24 is "Our Productive Network." The morning session will be devoted to addresses on "What Is Happening in New England Industry"; the afternoon session to papers on "This Business of Transportation."

The programs of the university will be continued on Thursday, June 26, in morning and afternoon sessions on "The Next Quarter Century." In the evening there will be music for members of the association and other guests of the university.

HEADQUARTERS AND HOTELS

Headquarters of the meeting will be in New Hampshire Hall, where mail and telegrams (Western Union) should be sent to reach persons attending the meeting. The press service will also be in New Hampshire Hall. All general sessions and sessions of sections and societies for the presentation of papers will be held in the university buildings which have an abundance of rooms conveniently near one another.

The university has several dormitories on the campus in which accommodations will be provided at \$1 per person per night. One of the new dormitories will be set aside for the accommodation of members accompanied by their families. There are, in addition, several modern and attractive fraternity and sorority houses in which rooms may be obtained at the same rates as in the dormitories. Persons desiring to arrange for rooms in the dormitories or in the fraternity or sorority houses should write for them to Mr. R. C. Magrath, treasurer of the university.

Although there are no hotels in Durham itself, there are many within half an hour's ride by automobile or bus in neighboring towns, most of which are on the coast. Information about these hotels can also be obtained from Mr. Magrath either by mail in advance of the meeting or upon arrival in Durham.

SCIENTIFIC PROGRAMS, EXCURSIONS AND DINNERS

Section on Mathematics (June 26, 27) will hold sessions on Thursday afternoon and Friday morning at which papers will be presented by Norbert Wiener and Aurel Wintner, Deane Montgomery, Garrett Birkhoff and Daniel C. Lewis, Jr., with a discussion by George D. Birkhoff.

American Meteorological Society (June 26-28) will hold a two-session program on Wednesday afternoon and Thursday morning for the presentation of papers

and will conduct an excursion to the Mt. Washington Observatory on Friday and Saturday under the leadership of C. F. Brooks, A. E. Bent and D. L. Arenberg.

Section on Geology and Geography and the Geological Society of America (June 23-28) will hold a joint session on Monday afternoon for the presentation of papers on "Bed-Rock Geology of Northern New England," a second joint session on Tuesday morning for the presentation of papers on "Recent Glacial Research in New England," and a third joint session on Tuesday afternoon for the presentation of papers pertaining to the geography of New England. Four days of field excursions will follow the indoor meetings. On June 25 a one-day itinerary will include the principal points of geologic and geographic interest in the vicinity of Durham.

On June 26, 27, 28 there will be a three-day excursion into the White Mountain region under the general leadership of Marland P. Billings. One day will be devoted to the Lake Winnepesaukee area, with Richard P. Goldthwait and Alonzo Quinn as assistant leaders. The newly described and spectacular Mt. Washington area will be examined on the second day. The final day will include a trip across the Mascoma and Cardigan quadrangles conducted by Dr. Katharine Fowler-Billings. As an introduction and orientation to the three-day excursion Professor Billings will present a paper, "Bedrock Geology of New Hampshire," at the first session on Monday afternoon.

Members and guests planning to participate in the long excursion should communicate with Dr. George H. White, University of New Hampshire, before June 16, since over-night accommodations away from Durham must be secured.

The American Association of Economic Entomologists (June 25, 26) will present in four sessions a comprehensive symposium on "Laboratory Procedure in Studies of the Chemical Control of Insects."

The program is as follows:

1. Introduction. W. C. O'Kane, University of New Hampshire.

SECTION I—REARING TEST INSECTS

2. Plant Feeding Insects. Leader, H. A. Waters, Ohio State University.
3. Stored Product Insects. Leader, N. H. Shepard, University Farm, St. Paul, Minn.
4. Insects Affecting Man and Animals. Leader, F. L. Campbell, Ohio State University.

SECTION II—LABORATORY TEST METHODS

5. Stomach Insecticides. Leader, Roy Hansberry, Cornell University.
6. Contact Insecticides, Including Ovicides. Leader, C. H. Richardson, Iowa State College.
7. Fumigants. Leader, R. T. Cotton, U. S. Bureau of Entomology and Plant Quarantine, Manhattan, Kans.

8. Aerosols (smoke). Leaders, L. D. Goodhue and W. N. Sullivan, U. S. Bureau of Entomology and Plant Quarantine, Beltsville, Md.

9. Fabric Protectors (mothproofing agents). Leader, F. W. Fletcher, Dow Chemical Company, Midland, Mich.
10. Attractants and Repellants. Leader, V. G. Dethier, John Carroll University, Cleveland, Ohio.
11. Termite Soil Poisons. Leader, W. E. McCauley, Natural History Survey Division, Urbana, Ill.

The Botanical Society of America (June 24-27), in keeping with the season, has planned a vacation program rather than merely a series of sessions for listening to formal papers.

In cooperation with other societies a series of interesting field trips has been arranged, beginning on June 21 at Mt. Monadnock and including a trip to the summit of Mt. Washington on June 26. A trip through Maine, led by F. H. Steinmetz, will begin on June 28 and end on July 4 at Mt. Desert Island. A detailed program and itinerary may be secured by addressing Dr. John A. Small, New Jersey College for Women, New Brunswick, N. J. It is expected also that visits to botanical laboratories in the New England States will be arranged, immediately preceding and following the sessions in Durham. A round-table discussion of the "New England Flora" will be held on Tuesday evening in Durham. A dinner for all botanists is arranged for Wednesday evening. This will be followed by two talks, one on the New England flora and another on a topic of special interest to the physiologists. The physiological section of the society will join the American Society of Plant Physiologists in several sessions.

The American Phytopathological Society (June 24-27) will hold sessions jointly with its New England Division from Tuesday to Friday, inclusive. The session will start at 10:00 A.M. at the F. A. Bartlett Tree Research Laboratories and arboretum in Stamford, Conn., where modern methods and tools used in the care of trees will be demonstrated. After a clambake given by the Bartlett Tree Expert Company the members will motor to New Haven to make a tour of the laboratories of Yale University and to examine the extensive collections of tree diseases and the facilities for research on forest pathology exhibited by the Office of Forest Pathology, U. S. Department of Agriculture. In the evening the Connecticut Agricultural Experiment Station will open to visitors its new greenhouses with their gadgets for ventilation and temperature control, and will exhibit the G. P. Clinton herbarium, precision apparatus for research on fungicidal sprays and dusts and the phenomenon of sedimentation and fractionation of dust clouds.

Wednesday morning will be spent at the Experiment Station Farm at Mt. Carmel, where the results with

several new organic fungicides will be displayed and chemotherapy for the control of Dutch elm disease will be demonstrated. Chestnut trees bred for blight resistance will be exhibited. After a picnic lunch at Sleeping Giant State Park the group will motor to the Tobacco Substation at Windsor, where possibly downy mildew, brown-root rot and mosaic of tobacco may be seen. The early evening will be devoted to technical papers followed by a smoker at their conclusion. Thursday will begin with a tour of a typical "shade" tobacco farm and curing sheds, after which the party will proceed to Waltham (Mass.) Field Station to inspect the results of researches on the control of greenhouses and field vegetable, flower and small fruit diseases. Thence the phytopathologists will travel on to Durham to join in the association programs and to attend the evening concert as guests of the University of New Hampshire. See the program of the Torrey Botanical Club below for details of other excursions.

The American Society of Plant Physiologists (June 25, 26) will join with its New England Section and the Physiological Section of the Botanical Society of America in sessions for the presentation of papers on Wednesday afternoon and Thursday morning. On Thursday afternoon they will hold a joint session with the American Society for Horticultural Science. The plant physiologists will participate in the dinner for all botanists on Wednesday evening.

The Torrey Botanical Club (June 22-July 4) will begin its two-weeks' series of field trips at 8:30 A.M. on Sunday, July 22, from Jaffrey, N. H., for an ascent of Mt. Monadnock, under the guidance of H. I. Baldwin of the Forestry and Recreation Department of New Hampshire. In the afternoon members of the club will visit the Caroline A. Fox Research and Demonstration Forest at Hillsboro. On Monday the club will join with the Ecological Society of America, the American Fern Society, the American Society of Plant Taxonomists, in an excursion to Spruce Hole and Cedar Swamp, under the leadership of C. F. Jackson and Albion Hodgdon, of the University of New Hampshire. On Tuesday the same societies will join in a study of York County flora; and on Wednesday in field trips to Nippo Pond and the White Mountains. On Thursday the societies will ascend Mt. Washington. On Friday explorations of the Mt. Washington region will be continued. Beginning on Saturday, June 28, the societies will transfer their activities to Maine and continue until Friday, July 4, visiting Greenville, a Maine woods sporting camp, Mt. Katahdin, Calais or Eastport, the raised bogs and coast vegetation of Washington County, Mt. Desert Island and Acadia National Park. The Maine tour will be taken with the assistance of F. N. Steinmetz and his

colleagues of the University of Maine. All trips will require registration in advance with Dr. H. I. Baldwin, Dr. C. F. Jackson, Dr. J. A. Small or at the association registration desk in New Hampshire Hall.

The American Fern Society, the *American Society of Plant Taxonomists* and the *Sullivant Moss Society* will participate in the field trips outlined under the program of the Torrey Botanical Society above.

The New England Botanical Club (June 26, 27) will conduct a field collecting trip in Merrimac County and the western part of Strafford County, N. H., on which members of other botanical clubs will be welcome.

The Ecological Society of America (June 23-26), in addition to participating in the excursions outlined under the program of the Torrey Botanical Club above, will hold a symposium on Mt. Washington ecology at the Alpine Gardens under the leadership of Robert F. Griggs of George Washington University. The participants in the symposium will be Charles F. Brooks, Richard P. Goldthwait, Stuart K. Harris, A. J. Grant, Charles F. Jackson, Maurice Provost, C. P. Alexander and H. B. Washburn.

The Section on the Social and Economic Sciences (June 24-26) will hold six sessions for the presentation of papers and will join with the American Society of Agronomy in a banquet on Thursday evening at which "Soil Conservation in the Northeast" will be discussed. The subject of the two sessions to be held on Tuesday is "The Second Colonization of New England," the morning session under the chairmanship of C. C. Zimmerman and the afternoon session under the chairmanship of A. M. Myrkmán. The subject of the Wednesday morning session is "Ecological and Demographic Aspects of the New England Area," which will be under the chairmanship of George A. Lundberg. In the afternoon the subject will be "Social Organization and Public Policy," Charles W. Coulter, chairman. The subjects for the two Thursday sessions are "Typical Problems of the New England Area: People and Resources" and "Social Welfare in New England," Charles W. Coulter presiding at the former and George A. Lundberg at the latter. On Thursday evening the section will join with the Northeastern Section of the American Society of Agronomy in a banquet at which H. H. Bennett will speak on "Soil Conservation in the Northeast."

The Section on Medical Sciences (June 24) will hold two sessions on Tuesday at which 17 papers on subjects of general interest in medical science will be presented. They are on such diverse subjects as "The Influence of Glucose on the Absorption and Toxicity of Sulfapyridine," "The Effect of Cystine on Human Milk Production," the "Germicidal Efficacy of Quaternary Ammonium-type Compounds," "Cerebrospinal

Fluid Circulation and the Hearing," "The Hormonal Origin of Heart Damage and Heart Failure," and "Anomalies of the Respiratory System." The staff of the University of Vermont College of Medicine is well represented on the program.

The *American Dietetic Association* (June 26) will hold two sessions on Thursday for the presentation of papers and a luncheon on Thursday noon. The general theme for the first session is "Children Should Be Well Nourished," and for the second it is "Nutrition and National Defense." May E. Foley, of the Massachusetts Nutrition Defense Council, will preside at the first session and Dorothy Duckles, nutritionist of the Boston Community Health Association, will preside at the second. Gladys E. Hall, educational director of the American Dietetic Association, will speak at the luncheon.

The *American Psychiatric Association* (June 26) will present a symposium of five papers on "The Psychiatric Aspects of Civilian Morale" under the chairmanship of Arthur H. Ruggles, superintendent of Butler Hospital, Providence, R. I.

The *American Society of Agronomy, Northeastern Section* (June 25-27) will hold a Grassland Conference in three sessions on Wednesday at which 17 papers will be presented on various aspects of the subject. On Thursday members of the society will visit the New Hampshire Agricultural Experiment Station at Durham, and outlying farms on Friday. The society will join with the Section on the Social and Economic Sciences in a banquet on Thursday evening at which H. H. Bennett will deliver an address on "Soil Conservation in the Northeast."

The *Society of American Foresters* (June 24-26) will hold two sessions on Tuesday, each consisting of

two sections, and two sessions on Wednesday for the presentation of scientific papers. The subject of Section I of the first session is "Forest Insects and Diseases" which will be discussed in six papers. Section II of the first session will consist of five papers on "Forest Fire Control." The chairmen of these sessions in the order they have been listed are H. B. Peirson, Austin H. Wilkins, Perley Spaulding and Harris A. Reynolds. On Wednesday the society will hold two sessions, the first under the chairmanship of Clifford Graham. A total of 27 papers will be presented. On Tuesday evening the society will have a Forester's Outdoor Lobster Dinner (stag) at the Green Gate, in Exeter. At 5 p.m. on Wednesday the members will leave Durham by motor to visit the State Bath House at Hampton Beach. In the evening members of the society will have a shore dinner (ladies invited) in the Ashworth Hotel in Hampton Beach, at which Henry Schmitz, editor-in-chief of the *Journal of Forestry*, will deliver an address. On Thursday the members of the society will make an all-day excursion by automobile to the Pawtuckaway Reservation, the Manchester Water Works Forest (in which a buffet luncheon will be served) and the Bear Brook Recreational Area, at which the trip will terminate, with bathing and picnic supper for those who desire them. Explanatory addresses and demonstrations will be given at all the principal points visited.

The Horticulturists of New England and Eastern Canada will hold a meeting at Durham on June 26 and 27, partly in connection with the American Society of Plant Physiologists. The society will hold a dinner on Tuesday evening and a program on "Hardy Body Stocks for Apple Trees," under the chairmanship of J. H. Waring, of the University of Maine.

THE AMERICAN PHILOSOPHICAL SOCIETY. II

ABSTRACTS OF PAPERS PRESENTED AT THE PHILADELPHIA MEETING

(Continued from p. 466)

By Professor EDWIN G. CONKLIN

VICE-PRESIDENT AND EXECUTIVE OFFICER; PROFESSOR EMERITUS OF BIOLOGY,
PRINCETON UNIVERSITY

Mental abilities: EDWARD L. THORNDIKE. Psychology once held the view that attention, memory, imagination, reasoning and the like were general faculties or powers of the mind. But experimentation showed (1) that the improvement of an ability by training was specific, not general, and (2) that the correlations between different manifestations of an ability were far from perfect. A mental ability is, as an observed fact, only a probability that certain tasks can be achieved by the possessor of the ability. The meter or test by which psychology measures an ability is usually a selected set of tasks, a sort of

inventory by sampling. The scores computed from most of such inventories are best expressed by arranging the tasks in progressive levels of difficulty and stating the percentage of success at each level, or, more conveniently, the level of difficulty at which the person achieves some specified percentage of successes. Psychology seeks to attain adequacy and purity in its measures of an ability; that is, to measure all of it and nothing but it. Purity is especially hard to attain, because abilities are as a rule affiliated, so that the test or meter for any one gives a score that is contaminated, so to speak, by the influence

of others. Factor analysis replaces the set of impure abilities measured by the actual tests by a set of purer factors or components. What services such factors will perform for science, and how far they will be identifiable and measurable is not yet known. Some critics think that they are unrealizable abstractions. Every mental ability presumably depends entirely upon certain structures and activities in the brain. Neurology and psychology have got rid of certain former errors, but do not yet know what these structures and activities are for any of the higher and more complex abilities.

Psychoanalysis and the scientific method: CARNEY LANDIS. Psychoanalysis must be considered as a grouping of three diverse subjects, *viz.*, a therapeutic method, a speculative philosophy (metapsychology) and an experimental psychological procedure. Considered as a psychological experiment, it is possible to subject psychoanalytic findings and reports to the usual criteria imposed by scientific methodology. Such phenomena as anxiety, resistance, unconscious memories, transfer, insight, etc., are psychological experiences which are a result of, or a concomitant of, the particular form of experimental procedure used in psychoanalysis. There is no need to have recourse to a speculative system of philosophy to explain or understand these phenomena. The application of the usual criteria of scientific research to psychoanalytic procedures shows that the acceptance of Freudian metapsychology in anthropology and in the social sciences is unnecessary. Psychoanalytic reports have forced psychologists to recognize and to inquire extensively into the role of early childhood development of mental life as it affects the mental life of the adult; have shown the importance of forgotten memories and childhood fantasies as they influence the thought and action of the adult; and has forced the attention of psychologists to the facts of the psychology of sex and sexuality. In brief, psychoanalysis has contributed a form of psychological experiment which has brought out much of value to psychology, but these contributions have been overshadowed, and partly overlooked, because of the greater emphasis on a speculative philosophy which is non-scientific.

Psychology and defense: ROBERT M. YERKES. In the World War, American psychologists pioneered by making their methods serve the army and navy. Our allies and antagonists made slight use of military psychology. Following the war the subject was neglected in America, and no provision was made in our military establishments for further development of methods or of personnel. Germany, however, entered into our progress and between wars molded psychology and psychotechnology as instruments of social progress. Research and training centers were established, and hundreds of men were trained for service to the state. Of these, many became military psychologists. The contrast is striking. Ours in 1917-1918 was the initiative and leadership in this new field of professional service; to-day leadership has passed to the Nazis, who have an unparalleled organization to deal with problems of propaganda, morale, personnel and like matters of human engineering. We have no comparable

organization, few military psychologists and no training schools in army or navy to meet prospective needs. But psychology has other than military values for defense. The so-called learned professions of medicine, law, religion meet but a fraction of recognized needs. From the sciences of physics and chemistry have developed branches of engineering which enable us to control physical environment. But corresponding developments from the biological sciences of branches of human engineering to shape and control the nature and nurture of man exist in promise rather than fulfillment. Medicine during the centuries has developed into a highly prized learned profession, concerned chiefly with making or keeping us well and vigorous. There is no comparable profession to which the normal, ordinary individual can turn for information, prognosis, advice or other guidance in matters of self-development, education, vocational choice, social adjustments. In the interest of social progress it would seem incomparably more important to improve human nature and increase the ability and usefulness of the individual, than, in accordance with our current concentration of effort, to prolong life into senility or to preserve those hopelessly defective, insane or otherwise afflicted. For this purpose, psychobiology, psychology and the social sciences should be invaluable. There is urgent, although inarticulate, need for a new profession or group of professions to fill the gap between medicine and religion. Therefore the following proposal: That psychology be recognized as a profession basic to the development of all branches of mental engineering; that professional schools of psychology similar in principle to those of medicine and physical engineering be established; that following successful completion of four years of work graduates of such schools be awarded the degree of doctor of psychology instead of doctor of philosophy, and in case they desire to practice their profession, be licensed under appropriate federal and state laws. In this picture, psychology stands as complement to the great profession of medicine. It would, however, be concerned primarily with assistance to the normal, healthy individual, whereas medicine is necessarily concerned in first line with the abnormal or pathological person.

Motivation, learning and adjustment: EDWARD C. TOLMAN. The values which for us human beings adhere to environmental objects and situations derive from the basic biological and social drives. The intrinsic values belong to the final states of "satiation and sufferance." Environmental objects and situations acquire instrumental values in that they serve as means or hindrances. A distinction must be drawn, however, between values, as we, the omniscient observers, know them, and subjective desirabilities, or "valences," as the individual projects them into the environment. Most of the serious problems of motivation arise out of incorrect valences, projected by the individual and which do not correspond to the true values. Such incorrect valences arise from incorrect "beliefs." Normally, beliefs are established through learning. And, when so established, they tend to be correct and "rational." As rational, they are easily subject to relearning and correction. Situations of undue frustra-

tion and conflict, however, tend to lead not to learning but to beliefs which are erroneous and almost inevitably "irrational" or "traumatic." The essence of such irrational or traumatic beliefs is that they are tremendously resistant to correction through further learning. The uncovering of the types of childhood situation which tend to develop such irrational traumatic beliefs and resultant incorrect valences was Freud's major contribution. The ghastly picture which the international scene exhibits to-day is, I believe, the result of a special case of traumatic beliefs. We human animals, living in groups, traumatically "identify" with these groups and accept the successes of the latter, or of their leaders, as substitutes for our own successes. This tendency appears to be insuperable. Two solutions, however, suggest themselves: an amelioration of the individual's lot within the group; and the enlargement of the size of the controlling group until hostility from other groups becomes bootless.

Egyptian planetary texts: O. NEUGEBAUER. There exist only three Egyptian texts dealing with astronomy in the modern sense of the word, all of them written in Demotic and belonging to the period of the Roman domination of Egypt. One of them gives the calculation of the new moons and has been published by Neugebauer and Volten in 1938. The two other texts are tables for the movement of the planets during a given period of years: the papyrus Berlin P 8279 rev. was published by Spiegelberg in 1902, but he only gives a very unreliable translation without commentary. The second document (the so-called "Stobart Tablets," now in Liverpool) was published in 1855 by Brugsch, philologically very excellent but also with very little astronomical commentary. It seemed necessary, therefore, to give a modern edition of these planetary texts, based on a careful investigation of the originals and accompanied by historical, paleographical and astronomical commentaries. It was possible to arrive at a complete understanding of the content of the texts and in this way to correct an error in their dating given by Brugsch. Many different questions are involved in determining and checking the planetary positions given, e.g., the calendar system employed, the problem of the origin of the counting of longitudes in the ecliptic or the reliability of the Greek reports on Egyptian astronomy. Special considerations have been devoted to the paleography of Demotic number signs and to the symbols for planets and zodiacal signs, which are the basis for the notation still used to-day.

The Syro-Hittite civilization in the light of the excavations at Hamath on the Orontes: HARALD INGHOLT. During these excavations, sponsored by the Carlsberg Foundation of Copenhagen, Denmark, and undertaken during the years 1931-1938, twelve different levels were unearthed. Of particular interest were the finds made in two consecutive layers representing the material culture of the city from about 1200 to 720 B.C., the year in which Hamath was conquered by Sargon, king of Assyria. Typical of the oldest of these two levels was the custom of cremation, the gradual introduction of iron and the occurrences of inscriptions in the Hittite hieroglyphic script, all

three characteristics together peculiar to the so-called Syro-Hittite culture. More than 1,100 cinerary urns, found in the city below the mound, contained a wealth of different small objects giving valuable information about the bearers of this civilization. They were the Peoples from the Sea, Indo-European tribes who during their wanderings about 1200 acquired new homes in the Aegean world, in Anatolia and in Syria-Palestine. In the more recent of the two levels, which begins about 950 B.C. cinerary urns were still found in the city below the mound; but no doubt another ethnic element, the Semitic Aramaeans, had taken over the power. Extensive architectural remains of Syro-Hittite type were brought to light on the mound itself, permitting the reconstruction of a monumental entrance to the citadel, a temple and two palaces. A number of basalt sculptures were found, most of them lions guarding the entrances to the buildings. Several graffiti in Aramaic bear witness to the language of those now in power, even though a few inscriptions in the Hittite hieroglyphic script and graffiti similar to one recently found at Boğazköy still remind us of the former ruling class. The civilization of the Peoples from the Sea has had a profound influence not only on the countries of the Near East, but also on the Etruscans and the Greeks.

Sumerian literature: A preliminary survey of the oldest collection of literary creations in the world inscribed on clay tablets dated approximately 2000 B.C.: SAMUEL N. KRAMER. The dominant cultural group in the Near East from prehistoric days to the end of the third millennium B.C. were the Sumerians, a non-Semitic people whose very name, erased from the memory of man for over 2,000 years, was not identified until 1869. From 1877 on, however, Sumerian monuments and inscriptions have been excavated in large quantities in the ancient sites of Sumer such as Lagash, Nippur, Shuruppak, Kish, Uruk and Ur. Of all these excavations, those conducted by the University of Pennsylvania at Nippur proved particularly unique and significant; they uncovered a large group of tablets and fragments dated approximately 2000 B.C. and inscribed with Sumerian literary compositions consisting of epics and myths, hymns and laments, proverbs and "wisdom." As practically the oldest written literature of significant quantity ever uncovered, these compositions which influenced profoundly all the peoples of ancient Near East including the Hebrews and Greeks, furnish new, rich and unexpected source material for all the related humanities. Unfortunately the contents of these compositions are still unavailable to layman and scholar, primarily because for almost half a century the larger part of the tablets and fragments have been lying uncopied and unpublished in the Museum of the Ancient Orient at Istanbul and in the University Museum at Philadelphia. To remedy this situation the writer has spent twenty months in Istanbul copying 170 "literary" pieces and has devoted the better part of the past two years to the studying and copying of the Sumerian literary material in the University Museum. As a result, the reconstruction and translation in the course of the next few years, of a large group of Sumerian literary compositions, are now

assured. To demonstrate concretely the method and process of reconstructing these compositions and to illustrate the swing and rhythm, the mood and temper of their poetic contents, the writer read with explanatory comment his translation of "Inanna's Descent to the Nether World," a universally significant myth whose contents he has succeeded in reconstructing in the course of the past five years.

The ship of the soul on a group of grave-stelae from Terenuthis: CAMPBELL BONNER. In this paper four small grave-stelae from Terenuthis in lower Egypt are illustrated, and their interpretation is discussed. The period of the burials was at the end of the fourth or the beginning of the fifth century of the Christian era. In all four examples a figure representing the deceased person is in a boat or is about to enter one. It is well known that the ancient Greeks often compared human life to a voyage, and the imagery connected with the ship of life was taken over by the Christians. In consequence of this, the ship-symbol occurs on a number of Christian tombs in the catacombs of Rome. In previously published material

from Christian Egypt, this symbol is rarely found; and yet the Christian idea of the ship of the soul divinely guided to its final harbor was probably accepted all the more readily in Egypt, because the people had inherited from dynastic times the belief that the soul was carried in a boat, sometimes with the guidance of a divine ferryman, to the abode of the blessed.

Some pre-armada propagandist poetry in England: TUCKER BROOKE. In the years 1585 and 1586, when England was expecting invasion by Spain, and combating "fifth-column" activities which centered around Mary Queen of Scots, the Oxford University Press issued a series of sixteen-page pamphlets intended to sustain the national morale. They were in Latin verse and appear to have had a wide distribution, but they have never been reprinted and are almost unknown to bibliographers. A set has been discovered at the Huntington Library and another at Winchester College, England. The most interesting of the contents are twelve odes, written during 1585 and 1586 and offering practically a month-by-month expression of national feeling.

SCIENTIFIC EVENTS

A READING MACHINE FOR MICROFILMS

Mathematical Reviews, the new international abstracting journal of mathematics, which has established a microfilm reprint service enabling subscribers to obtain a copy of any article reviewed has now arranged for the manufacture and supply of a reading machine for microfilm.

When the microfilm reprint service was introduced, it was realized that the usefulness of this service would depend to a large extent upon the availability of reading machines. The Committee on Scientific Aids to Learning of the National Research Council is promoting, among other things, the use of microfilm. As a result of its efforts, a reading machine is being manufactured which will be sold at a retail price of \$32.00. A grant from the Committee on Scientific Aids to Learning has made it possible for *Mathematical Reviews* to distribute a limited number of these machines on the following terms:

A reading machine for microfilm will be given—as long as the available supply lasts—to any person who has paid his subscription, at the rate to which he is entitled, to *Mathematical Reviews* in advance for three years beginning January, 1941. The person who receives a reading machine must pay express charges and import duty, if any, from Buffalo, N. Y. Until January 1 this offer was made only to the present subscribers.

In the fall of 1939, an advisory group on microphotography to the Committee on Scientific Aids to Learning, composed of Keyes D. Metcalf, director of the Harvard University Library, *chairman*; Professors Ralph D. Bennett and Ernest H. Huntress,

of the Massachusetts Institute of Technology; Dr. Vernon D. Tate, of the National Archives, and Dr. Irvin Stewart, director of the Committee on Scientific Aids to Learning, *ex officio*, was requested to consider the possibilities of designing and making available a simple, inexpensive microfilm reading machine for the use of the individual scholar. Several designs were suggested, and three models were constructed. Each of these models was thoroughly tested both in the laboratory and in actual use; a set of plans and specifications embodying the final accepted design was prepared for distribution to manufacturers specializing in equipment of this type.

Bids for the manufacture of the reading machine were received from a number of companies, and the Spencer Lens Company was authorized to build a pilot model. It was built, tested and inspected, and the Committee on Scientific Aids to Learning has now signed a contract for a number of these machines. In addition, they will be placed on the market by the Spencer Lens Company.

FELLOWSHIPS IN THE NATURAL SCIENCES OF THE NATIONAL RESEARCH COUNCIL

THE National Research Fellowship Board in the Natural Sciences of the National Research Council has made the following fellowship appointments for the academic year 1941-1942:

Paul J. Allen (Ph.D., plant physiology, University of California, 1941). At Harvard University. The intermediate carbohydrate metabolism of the obligate parasite, *Erysiphe graminis*, with a comparative study of different strains.

- Ernest Ball (Ph.D., botany, University of California, 1941). At Yale University. Experimental studies on the shoot apices of Angiosperms.
- Robert George Ballentine (Ph.D., biology, Princeton University, 1940). At the Rockefeller Institute for Medical Research, New York City. The chemical organization of cell surface.
- Edward Griffith Begle (Ph.D., mathematics, Princeton University, 1940). At the University of Michigan. The structure of generalized manifolds and related spaces.
- Orlin Biddulph (Ph.D., botany, University of Chicago, 1934). At the State College of Washington. Studies in translocation of phosphorus in plants (by means of radiophosphorus). (On a participating basis with the State College of Washington.)
- Charles Kilgo Bradsher (Ph.D., organic chemistry, Harvard University, 1937). At Duke University. Aromatic cyclodehydration. (On a participating basis with Duke University.)
- Stuart Robert Brinkley, Jr. (Ph.D., physical chemistry, Yale University, 1941). At Harvard University. A systematic study of the normal vibrations and force contents of related molecules.
- Sidney Michael Dancoff (Ph.D., physics, University of California, 1939). At the Institute for Advanced Study. Interaction of mesotrons and nuclear particles.
- Walter Gordy (Ph.D., physics, University of North Carolina, 1935). At the California Institute of Technology. Spectroscopic studies of the hydrogen bond.
- John Edward Harris (Ph.D., biochemistry, State University of Iowa, 1940). At the University of Pennsylvania. The influence of the metabolism of the erythrocyte on its cation permeability and osmotic properties.
- Walter Lincoln Hawkins (Ph.D., organic chemistry, McGill University, 1938). At Columbia University. The antimalarial constituents of *Alstonia* bark.
- Morton Henry Kanner (Ph.D., physics, Princeton University, 1940). At the California Institute of Technology. Photodisintegration of deuterium.
- Ellis Robert Kolchin (Ph.D., mathematics, Columbia University, 1941). At the Institute for Advanced Study. A further study of differential ideals.
- Merle Lawrence (Ph.D., psychology, Princeton University, 1941). At the Johns Hopkins Medical School. The cause of auditory impairment for high tones.
- James Van Gundia Neel (Ph.D., genetics, University of Rochester, 1939). At Columbia University. Studies on the interaction of mutations affecting the chaetae of *Drosophila*.
- Frederick Stanley Philips (Ph.D., zoology, University of Rochester, 1940). At Yale University. The isolation of anisometric proteins present in echinoderm and amphibian eggs and the study of their physical-chemical properties.
- Louis Douglas Roberts (Ph.D., physical chemistry, Columbia University, 1941). At Cornell University. The thermodynamic properties of partially miscible binary liquid mixtures near the critical temperature.
- Francis Joseph Ryan (Ph.D., zoology, Columbia University, 1941). At Stanford University. Temperature as a means for the identification of developmental processes.
- Richard Evans Schultes (Ph.D., biology, Harvard University, 1941). At the Instituto de Ciencias Naturales, Bogota, Colombia. The ethnobotanical aspects of the flora of Colombia.
- Carl Keenan Seyfert (Ph.D., astronomy, Harvard University, 1936). At Mount Wilson Observatory. The relationship between emission in the spectra of galactic and extragalactic nebulae.
- Roger Wolcott Sperry (Ph.D., zoology, University of Chicago, 1941). At Harvard University. Determination of the higher centers involved in development of new motor habits following operative disarrangement of peripheral nerves and muscles in mammals.
- Hubert Kirk Stephenson (Ph.D., geology, Princeton University, 1940). At the Massachusetts Institute of Technology. The magnetic properties of minerals.
- George E. Valley, Jr. (Ph.D., physics, University of Rochester, 1939). At Harvard University. Gamma-ray spectra.
- Sam Isaac Weissman (Ph.D., chemistry, University of Chicago, 1938). At the University of California. The spectra of coordination compounds of europium and the configuration of related compounds.
- Frank Bradshaw Wood (Ph.D., astronomy, Princeton University, 1941). At the University of Arizona. Photoelectric light curves and elements of eclipsing binaries.

A NEW SOCIETY FOR X-RAY AND ELECTRON DIFFRACTION RESEARCH WORKERS

THE replies to a questionnaire submitted to American x-ray and electron diffraction research workers by the National Research Council Committee on X-Ray and Electron Diffraction show a majority of about 3½ to 1 in favor of the formation of a new society by this group. Such a society is therefore being organized.

Any research worker in this field who has not already received an application blank and a ballot for the election of officers for 1941 and for deciding between the names "American Society for Molecular and Crystal Structure Research" and "American Society for X-Ray and Electron Diffraction," may obtain them by writing the undersigned. For the ballot to be valid, it must be returned on or before June 16. Those applying by that date will be included in the list of charter members. Dues for the balance of 1941 are one dollar.

The first meeting of the new society will be at Gibson Island, Md., from July 28 to August 1, coinciding with the Conference on X-Ray and Electron Diffraction, sponsored by Section C of the American Association for the Advancement of Science. Registration for this meeting is in the hands of Dr. Neil E. Gordon, Central College, Fayette, Mo., the director

of the whole series of Gibson Island conferences. For the program and other details, see the *News Edition* of the American Chemical Society, April 10.

The demand for a new organization arises from the fact that x-ray and electron diffraction researches are scattered widely among various fields—chemistry, physics, mineralogy, metallurgy and others. The society will presumably sponsor meetings or conferences at which its members can get together and discuss their methods and mutual problems. The National Research Council Committee recommends to the society that it do not start a new journal at this time, but that it consider the possibility again at the end of the present emergency, in the event that the *Zeitschrift für Kristallographie* and the *Strukturbericht* remain Nazified or cease to exist. In the meantime, we suggest that, if the details can be worked out satisfactorily, the society distribute reprints of papers in its field by its members to its members.

Other possible function of the society, including some closely connected with the national defense program, will doubtless be considered by the officers and by the membership at the Gibson Island meeting.

MAURICE L. HUGGINS, *Chairman,*
National Research Council Committee on
X-Ray and Electron Diffraction

KODAK PARK,
ROCHESTER, N. Y.,
MAY 15, 1941

THE ANNUAL MEETING OF THE TRUSTEES OF SCIENCE SERVICE

At the annual meeting of the trustees of Science Service on May 1 Dr. Edwin G. Conklin, executive vice-president of the American Philosophical Society and professor emeritus of biology at Princeton University, was reelected president. Dr. Harlow Shapley, director of the Harvard College Observatory, was reelected vice-president and chairman of the executive committee of the board. O. W. Riegel, director of the Lee School of Journalism at Washington and Lee University, was reelected treasurer.

Frank R. Ford, editor of the Evansville, Indiana, Press, was elected a member of the governing board of trustees. Other Science Service trustees are: Dr. C. G. Abbot, secretary of the Smithsonian Institution; Dr. J. McKeen Cattell, editor of *SCIENCE*; Dr. Ross G. Harrison, Yale University; Dr. H. E. Howe, editor of *Industrial and Engineering Chemistry*; Dr. W. H. Howell, the Johns Hopkins University; A. H. Kirchhofer, managing editor of the *Buffalo Evening News*; Dr. R. A. Millikan, California Institute of Technology; H. L. Smithton, secretary of the E. W. Scripps Company; Neil H. Swanson, managing editor of the *Baltimore Evening Sun*; Dr. Warren S. Thompson,

Scripps Foundation for Research in Population Problems; Dr. Henry B. Ward, University of Illinois.

The trustees of Science Service are nominated by five scientific or journalistic bodies: the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the journalistic profession and the E. W. Scripps Estate. Science Service is an institution not for profit which serves as an intermediary between the scientific world and the public. It is now in its twentieth year of operation.

MEDAL DAY AT THE FRANKLIN INSTITUTE

THE presentation of medals by the Franklin Institute was held on the afternoon of May 21. A dinner in honor of the medalists was given in the evening. Those receiving the awards were as follows:

Certificate of Merit—Charles William Akers, president, Breeko Corporation, Nashville.

Longstreth Medal—Benjamin James Wilson, chief, mechanical division, Research Department, Leeds and Northrup Company, Philadelphia.

Wetherill Medal—Harold Stephen Black, Bell Telephone Laboratories, New York City.

Brown Medal—Willis Haviland Carrier, chairman of the board, Carrier Corporation, Syracuse.

Clark Medal—Raymond Mower Conner, director, Testing Laboratories, American Gas Association, Cleveland.

Levy Medal—John Moyes Lessells, associate professor of mechanical engineering, the Massachusetts Institute of Technology, and Charles Winters MacGregor, associate professor of mechanical engineering, the Massachusetts Institute of Technology.

Potts Medal—Harold Eugene Edgerton, associate professor of electrical engineering, the Massachusetts Institute of Technology.

Cresson Medal—The United States Navy, received by the Honorable Ralph A. Bard, assistant secretary of the Navy, Washington, D. C.

The Franklin Medal and Certificate of Honorary Membership—Sir Chandrasekhara Venkata Raman, director, Indian Institute of Science, Bangalore, received by Sir Gerald Campbell, Envoy Extraordinary and Minister Plenipotentiary, the British Embassy, Washington, D. C.

The Franklin Medal and Certificate of Honorary Membership—Edwin Howard Armstrong, professor of electrical engineering, Columbia University.

THE AMERICAN ACADEMY OF ARTS AND SCIENCES

At the annual meeting of the American Academy of Arts and Sciences, held on May 14, officers were elected for the year 1941-42:

President Harlow Shapley
Vice-president for Class I Percy W. Bridgman

<i>Vice-president for Class II</i>	S. Burt Wolbach
<i>Vice-president for Class III</i>	Sidney B. Fay
<i>Vice-president for Class IV</i>	Fred N. Robinson
<i>Corresponding Secretary</i>	Abbott P. Usher
<i>Recording Secretary</i>	Hudson Hoagland
<i>Treasurer</i>	Horace S. Ford
<i>Librarian</i>	Frederick H. Pratt
<i>Editor</i>	Robert P. Blake

Thirty-five fellows and two foreign honorary members were elected as follows:

FELLOWS

Mathematical and Physical Sciences: Edward Lindley Bowles, the Massachusetts Institute of Technology; George Whiteley Coggeshall, Cambridge; Charles Stark Draper, the Massachusetts Institute of Technology; Charles Edward Kenneth Mees, Eastman Kodak Company, Rochester, N. Y.; Isidor Isaac Rabi, Columbia University; Reinhold Rüdenberg, Harvard University; Harry Boyer Weiser, Rice Institute, Houston, Texas; Fred Lawrence Whipple, Harvard College Observatory; Ralph Chillingworth Young, the Massachusetts Institute of Technology; Vladimir Kosma Zworykin, R. C. A. Manufacturing Company, Camden, N. J.

Natural and Physiological Sciences: Fuller Albright, Harvard Medical School; Alan Mara Bateman, Yale University; Walter Bauer, Harvard Medical School; Arthur Johnson Eames, Cornell University; Alan Richards Moritz, Harvard Medical School; Francis Otto Schmitt, Washington University, St. Louis, Mo.; Chester Stock, California Institute of Technology, Pasadena.

Social Sciences (including Administration and Affairs): Godfrey Lowell Cabot, Boston; Frederic Adrian Delano, Washington, D. C.; Carl Rupp Doering, Harvard School of Public Health; Erwin Nathaniel Griswold, Harvard Law School; Earl Jefferson Hamilton, Duke University; Hajo Holborn, Yale University; Edward Godfrey Huber, Harvard School of Public Health; Gaetano Salvemini, Harvard University; Francis Trow Spaulding, Harvard School of Education; A. Eugene Stanley, Fletcher School, Tufts College; Robert Ulich, Harvard School of Education; Laurence Leathe Winship, managing editor, *The Boston Globe*.

The Humanities: Warren Ortman Ault, Boston University; Giuseppe Antonio Borgese, University of Chicago; Archibald Thompson Davison, Harvard University; William E. Lingelbach, University of Pennsylvania; Walter Hamor Piston, Jr., Harvard University; James Bissett Pratt, Williams College.

FOREIGN HONORARY MEMBERS

Bernardo Alberto Houssay, University of Buenos Aires, and Jan Sibelius, Helsinki.

RECENT DEATHS AND MEMORIALS

DR. ARTHUR COMINGS LANGMUIR, research and consulting chemist of New York, died on May 14 at the age of sixty-nine years.

DR. FRANK ALBERT HAYES, professor of soil science in the College of Agriculture at the University of

Nebraska, in charge of soil surveys in the central northern Great Plains division of the Soil Survey, U. S. Department of Agriculture, died on May 13 at the age of forty-nine years.

MADISON MONROE GARVER, professor of physics at the Pennsylvania State College, died on May 11. He had been a member of the faculty from 1893 to 1925. He was also librarian in the School of Chemistry and Physics.

DR. GEORGE MARTIN HALL, head of the department of geology of the University of Tennessee, who had also long been a member of the U. S. Geological Survey, died on April 28 at the age of forty-nine years.

DR. ALLEN KRAMER KRAUSE, lecturer in medicine in the Johns Hopkins University, previously until his retirement in 1937 clinical professor of medicine in the Medical Schools of Stanford University and the University of Southern California and president of the Desert Sanatorium at Tucson, Ariz., known for his work on tuberculosis, died on May 12 at the age of sixty years.

DR. HARRY NICHOLS WHITFORD, manager for the last sixteen years of the crude rubber department of the Rubber Manufacturers' Association, Incorporated, who was from 1916 to 1923 professor of tropical forestry at Yale University, died on May 16 at the age of sixty-nine years.

DR. BRUCE MAYNE, special expert, U. S. Public Health Service, died on April 30 at the age of fifty-eight years. Since 1931 he had been in charge of the Malaria Research Laboratory at Columbia, South Carolina.

DR. W. M. SCOTT and Dr. Francis Griffith, of the British Ministry of Health, were killed in an air raid on April 16, when Dr. Griffith's house in London was directly hit by a bomb.

At the meeting of the Eastern Division of the American Philosophical Association to be held at Vassar College on December 29, 30 and 31, a plenary session in honor of the one hundredth anniversary of the birth of William James will be devoted to aspects of his work. Professors G. S. Brett, H. W. Schneider and D. C. Williams have been invited to read papers; Professor Ralph B. Perry will open the symposium with a brief appreciation of James.

In memory of the late Sir Frederick Grant Banting, a maple tree was planted on May 1 in mingled soil from several Canadian hospitals on the grounds of the Richmond Memorial Hospital, Prince Bay, S. I., as a part of National Hospital Day ceremonies. Dr. Milton Sills Lloyd, president of the medical staff, was in charge of the planting.

SCIENTIFIC NOTES AND NEWS

A SUBSCRIPTION dinner celebrating his ninetieth birthday was given by friends on May 20 in honor of Simon H. Gage, professor emeritus of histology and embryology, of Cornell University. The dinner also celebrated the establishment of the Simon Henry Gage Fellowship in Animal Biology, for which an endowment fund was started on his sixty-fifth birthday in 1916. Contributions have been received during the past twenty-five years by a committee which now consists of Dr. Benjamin F. Kingsbury, professor of histology and embryology, and Dr. Grant S. Hopkins, professor emeritus of veterinary anatomy. The University Board of Trustees at its recent meeting established the fellowship in the Graduate School effective next year, with a stipend of \$500.

DR. ARTHUR W. BURWELL, technical director of the Alox Corporation, Niagara Falls, N. Y., has been awarded the Jacob F. Schoellkopf Gold Medal of the Western New York Section of the American Chemical Society, in recognition of "his work in producing and utilizing fatty acids, lactones and other chemicals from petroleum." The presentation was made at a meeting in Niagara Falls on May 20.

DR. HENRY G. KNIGHT, chief of the Bureau of Agricultural Chemistry and Engineering of the Department of Agriculture, on May 17 was presented with the annual medal of the American Institute of Chemists in recognition of his work in searching for new and wider uses for surplus agricultural products. The presentation was made by Vice-president Wallace at the dinner following the annual meeting.

THE Chemistry Club of the Georgia State College for Women has awarded the 1941 Herty Medal to Dr. William F. Hand, for more than forty years professor of chemistry at the Mississippi State College. In addition to having carried out theoretical work on quinazolines, Dr. Hand has devised methods of analyzing agricultural products.

DR. HERMON CAREY BUMPUS, vice-president of the American Association of Museums, trustee of the Children's Museum, Boston, and until recently chairman of the advisory board of the National Park Service, was presented on April 23 with the Cornelius Amory Pugsley gold medal for 1940 awarded by the American Scenic and Historic Society.

At the recent New York convention of the American Foundrymen's Association, Herbert S. Simpson, president of the National Engineering Company of Chicago, was elected president to succeed Lester N. Shannon. Duncan P. Forbes, president of Gunite Foundries Corporation, Rockford, Ill., was elected vice-president. Awards of gold medals for "outstand-

ing contributions to the foundry industry" were made as follows: The J. H. Whiting medal to Donald J. Reese, of the Development and Research Division of the International Nickel Company, Inc.; the William H. McFadden medal to Max Kuniansky, general manager of the Lynchburg Foundry and Machine Company; the John A. Penton medal to Fred L. Wolf, technical director of the Ohio Brass Company, and the Joseph S. Seaman medal to Charles E. Hoyt, executive vice-president of the American Foundrymen's Association. The association will meet next year in Cleveland.

THE American Academy of Arts and Sciences at its meeting on May 14 made awards of \$4,300 each from the Francis Amory Fund to four investigators in the medical sciences. The three American investigators are Dr. Joseph F. McCarthy, professor and director of the department of urology, New York Polyclinic Medical School and Hospital; Dr. Carl Richard Moore, professor of zoology at the University of Chicago, and Dr. Hugh H. Young, professor of urology at the Johns Hopkins Medical School. The fourth recipient is a European in a country unhappily dominated by Nazi invaders. His name was not made public and his prize will be held here in trust. Each of the American recipients at the meeting briefly described his investigations, placing special emphasis on circumstances leading to the culmination of the work for which the prize was given. Citations describing the basis for these awards were published in *SCIENCE* on February 14.

It is reported in *Nature* that the following awards were presented on April 4 at the nineteenth annual meeting of the British Institution of Chemical Engineers—Osborne Reynolds Medal: M. D. Donald, lecturer in and at present in charge of chemical engineering at University College, London, and joint honorary secretary of the Institution of Chemical Engineers, for meritorious services to the institution during the year 1940; Moulton Medal: J. C. Farrant, of International Combustion, Ltd., for his paper, "A Review of Certain Unit Processes in the Reduction of Materials"; Junior Moulton Medal and Award: S. A. Gregory, of Moussec, Ltd., for his paper, "Plant Design in Microbiological Processes"; William Macnab Medal: J. V. S. Glass, of the Castner-Kellner Alkali Co., Ltd., for the best set of answers submitted in the 1940 associate-membership examination of the institution.

At the meeting of the Association for the Study of Internal Secretions, which was held at Atlantic City on May 2 and 3, Dr. Edgar Allen, of the department of anatomy at Yale University, became president in succession to Dr. Elmer L. Sevringhaus, of the Uni-

versity of Wisconsin. Dr. E. Kost Shelton, of Los Angeles, was chosen president-elect. The Squibb annual award in endocrinology for 1941 was made to Professor Philip E. Smith, of the department of anatomy of Columbia University.

THE following officers for 1941-42 were elected at the annual meeting of the American Society for Pharmacology and Experimental Therapeutics held in Chicago from April 15 to 19: *President*, E. M. K. Geiling, University of Chicago; *Vice-president*, Carl F. Schmidt, University of Pennsylvania; *Secretary*, Raymond N. Bieter, University of Minnesota; *Treasurer*, E. E. Nelson, Tulane University; *Councilors*, E. G. Gross, State University of Iowa, and Ralph G. Smith, University of Michigan.

At the first annual meeting of the Canadian Conservation Association held at London, Ontario, on May 9, the following officers were elected: Dr. John D. Detwiler, University of Western Ontario, *president*; Dr. Georges Maheux, Department of Agriculture, Quebec, and Dr. Wilbert A. Clemens, University of British Columbia, *vice-presidents*; Dr. Harold B. Hitchcock, University of Western Ontario, *secretary-treasurer*, and J. P. Turner, Ottawa, *editor*. Dr. Hugh H. Bennett, chief of the Soil Service, U. S. Department of Agriculture, gave an address entitled "The Conservation of the Soil." The next annual meeting will be held in Montreal.

DR. JOHN W. LASLEY, JR., professor of mathematics at the University of North Carolina, has been named president of the Southeastern Section of the Mathematical Association of America. During the past year he served as vice-president and was chairman of the local committee on arrangements.

THE South Dakota Academy of Sciences has elected officers for the year 1941-42 as follows: *President*, Dr. Henry Lowsma, professor of chemistry, Eastern State Normal School; *First Vice-president*, Dr. Edwin H. Shaw, Jr., professor of biochemistry, University of South Dakota; *Second Vice-president*, Orin M. Lofthus, professor of biology, Augustana College; *Secretary-Treasurer*, Dr. A. L. Haines, professor of chemistry, University of South Dakota.

DR. T. LYLE HAZLETT, medical director of the Westinghouse Electric and Manufacturing Company, was elected on May 9 president of the American Medical Association of Industrial Physicians and Surgeons at the Pittsburgh meeting. Dr. Edward C. Holmblad, of the Railway Express Agency, Chicago, was named to the newly established post of managing director. and Dr. John J. Whitmer, of the Consolidated Edison Company, New York, was chosen president-elect for 1942.

DR. ADOLF MEYER, director of the Henry Phipps

Psychiatric Clinic of the Johns Hopkins Hospital since 1912, will retire at his own request at the end of the academic year. He will be succeeded by Dr. John Clare Whitehorn, professor of psychiatry at Washington University, St. Louis.

DR. JOHN M. FOGG, JR., associate professor of botany at the University of Pennsylvania, has been elected dean of the College of Arts and Sciences and director of college collateral courses. He plans to continue his studies on the flora of Pennsylvania. He succeeds Dr. William E. Lingelbach, who retires on July 1.

AT Columbia University, Dr. Robert C. Elderfield, of the department of organic chemistry, has been promoted from an associate professorship to a professorship, and Dr. Arthur C. Cope, of Bryn Mawr College, has been appointed associate professor of chemistry. Dr. C. F. Hiskey, who has been at the University of Tennessee, has been appointed instructor in inorganic chemistry in the extension branch of the department of chemistry, and Dr. Walter H. Stockmayer, formerly of the Massachusetts Institute of Technology, has been appointed instructor in physical chemistry in the extension division of the department.

PROFESSOR A. T. POFFENBERGER, of the department of psychology at Columbia University, at his own request has been relieved of the executive position of that department which he has held for the last fifteen years. He will be succeeded on July 1 by Professor Henry E. Garrett, who has been appointed for a term of three years.

LYNN HAROLD LOOMIS, of the Society of Fellows at Harvard University, has been appointed faculty instructor in mathematics.

DR. E. U. CONDON, associate director of the Westinghouse Research Laboratories at East Pittsburgh, has announced the appointment of fellows in the laboratories of the company. The fellowship plan was inaugurated in 1938, the appointees to carry out original research on scientific problems of their own choosing in an attempt to discover new fundamental facts in the realm of pure science. Those elected fellows this year are Dr. Daniel Alpert, Stanford University; Dr. John W. Coltman, University of Illinois; Dr. Thomas W. Dakin, Harvard University; Dr. Theodore Holstein, New York University, and Dr. James S. Koehler, University of Pennsylvania. Announcement has also been made of the reappointment of the group of five investigators who were selected last year. They are Dr. Jerald E. Hill, University of Rochester; Dr. Sidney Krasik, Cornell University; Dr. Walter Kauzmann, Princeton University; Dr. Frederick W. Stallman, University of Illinois, and Dr. David P. Stevenson, the California Institute of Technology.

DR. LEIGH J. YOUNG, professor of silviculture at the University of Michigan, has been elected Mayor of Ann Arbor. Prior to his election he had served for four years as president of the City Council and for five years before that as alderman.

DR. DUNCAN GRAHAM, head of the department of medicine at the University of Toronto, has been appointed a member of the Canadian National Research Council, to fill the vacancy left by the death of Sir Frederick Banting.

A WIRELESS dispatch to *The New York Times* dated May 6 reports that Dr. John E. Gordon, of Harvard Medical School, was injured in a recent raid when his apartment was bombed. Dr. Gordon is acting as liaison officer between the Ministry of Health and the Harvard Public Health Unit that is shortly to be established in Great Britain.

DR. CHARLES C. LAURITSEN, professor of physics at the California Institute of Technology, and Dr. L. R. Hafstad, physicist of the Carnegie Institution of Washington, left on May 18 on the Atlantic Clipper for Lisbon on their way to London as representatives of the National Defense Research Committee.

H. T. EDWARDS and J. H. Kempton, tropical plant specialists of the U. S. Department of Agriculture, left Washington on May 13 to make an agricultural survey of Mexico and other Central American countries. The survey, under the direction of the Latin American division of the department, is being made to investigate possibilities of developing in the American tropics products which the United States now imports from more distant tropical regions.

DR. HOWARD T. KARSNER, professor of pathology at the School of Medicine of Western Reserve University, delivered on May 15 the eighth annual Arno B. Luckhardt Lecture at the University of Chicago. His subject was "Ovarian Tumors with Endocrine Dysfunction." The lecture was given under the auspices of the Delta chapter of Phi Beta Pi.

DR. LOUIS N. KATZ, director of cardiovascular research at the Michael Reese Hospital, Chicago, delivered on May 2 the first Dr. Samuel D. Gross Lecture of the Phi Delta Epsilon Fraternity at the Medical School of the University of Louisville. He spoke on "The Mechanism of Heart Failure."

THE eighth annual meeting of the New York State Geographical Association will be held at the Brockport State Normal School on October 11. The morning session will be given over to reports and papers on the geography of New York State. An afternoon field trip will demonstrate "The Development of Present Land Utilization of the Area from the Point of View of Historic Geography" under the direction of An-

thony J. West, of Brockport, head of the science department at the Normal School. After an informal dinner, a symposium on the trip will conclude the session.

A GRANT of \$600,000 from the Rockefeller Foundation has been received by Cornell University Medical College, New York City, for the endowment of the Department of Public Health and Preventive Medicine. This endowment will enable the college to expand its public health teaching both for medical students and for the personnel of the New York City Department of Health. For the past five years the foundation has made to the department an annual grant of \$28,000.

BY the terms of the will of Mary M. Condon, the University of Rochester will receive a fund of \$100,000 as a memorial to Dr. John P. Munn, physician, philanthropist and a former alumnus of that institution, whose secretary she had been. A life interest in the fund was bequeathed to Miss Condon upon the death of Dr. Munn in 1931. In assigning the principal of the trust to the Board of Trustees of the university, Miss Condon directed that it should be added to the John P. Munn fund, "heretofore created by a gift made by me to said university."

THE American Standards Association reports the completion of the revision of American standard abbreviations for scientific and engineering terms. This standard, providing as it does the shorthand of engineering and scientific language, has a very wide application. It includes such common terms as pounds per square inch (psi), dollar (\$), and dozen (doz), as well as kilograms per second (kgps), reactive volt-ampere (var), and British thermal unit (Btu). The standard has been developed by a group of engineers, editors and scientific men representing many national organizations. Leadership in the work has been taken by the American Association for the Advancement of Science, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education.

THE *News Edition* of the American Chemical Society prints an article by Callie Hull and Mildred Packard, of the National Research Council, giving a list, extending to ten pages, of scholarships, fellowships and grants for the furtherance of research sponsored by industry. This is in part a revision of the list in the *News Edition* of March 10, 1939, with additional data from companies which reported such activities in the survey made for the seventh edition of "Industrial Research Laboratories of the United States" (Bulletin No. 104, National Research Council, December, 1940).

DISCUSSION

PHYSICS, EXACTING BEYOND ALL COMPROMISE

How true the points made by Professor Williams in his recent discussion in *SCIENCE*,¹ and how forcefully he puts them. Perhaps more forcefully than he intended considering that the one worked-out physical problem which he expects his students to do by ordinary proportion is solved incorrectly! Fifteen years ago when quantum mechanics was first being developed, I was much impressed by a remark of the Göttingen mathematician, David Hilbert, who said, "Physics is becoming too difficult for the physicists." Perhaps it always has been and always will be, but those of us who love the subject will keep on trying anyway.

First let us consider the correct solution to Professor Williams's supposedly elementary problem. It is "Two spheres are charged with a combined charge of 15 esu. If the radii of the two spheres are 10 and 20 centimeters, respectively, what is the charge on each sphere when put to a common potential by touching one sphere to the other?" The solution given says the charge on the little sphere will be 5 esu and that on the larger one 10 esu, on the supposition that the charges divide in proportion to the respective radii.

The correct solution, however, is a matter of some difficulty, quite beyond the scope of the elementary course. The basic theory is presented, for instance, in Jeans's "Electricity and Magnetism," Chapter 4. The charges on the two spheres will be called Q_1 and Q_2 and their potentials V_1 and V_2 . Then,

$$\begin{aligned} Q_1 &= q_{11}V_1 + q_{12}V_2 \\ Q_2 &= q_{12}V_1 + q_{22}V_2 \end{aligned}$$

Let a be the radius of the first sphere, b that of the second and c be the center-to-center distance apart. Then if c is large compared to either a or b , the q 's have the values below, approximately,

$$q_{11} = a, \quad q_{12} = 0, \quad q_{22} = b.$$

Hence if the spheres are brought to the same potential, *not by touching them together*, but by keeping them far apart and connecting them with a very fine wire, we shall have $Q_1 = aV$ and $Q_2 = bV$, so the charges will distribute in proportion to the radii and so will be 5 esu and 10 esu for the particular example proposed.

But if the spheres are brought very close together, leading finally to contact, the q 's have quite different values, the calculation of which is a matter of rather difficulty theory (see pp. 196-199 of the fourth edition of Jeans) and thus the charges will distribute not in the ratio of $a : b$ but in the ratio of

$$(q_{11} + q_{12}) : (q_{22} + q_{12})$$

which will have a very different value. To avoid the labor of computing the q 's for Professor Williams's example let us take one for which the q 's are given by Jeans, namely, that in which the first sphere has a radius $a = 7$ cm, while for the second $b = 1$ cm and the center to center distance is $c = 10$ cm. Then the q 's are

$$q_{11} = 7.576, \quad q_{12} = -0.814, \quad q_{22} = 1.160$$

instead of

$$q_{11} = 7, \quad q_{12} = 0, \quad q_{22} = 1$$

which are the values when c is very great. The result is that if the potentials are equalized by keeping the spheres at this distance and connecting them with a fine wire, the charges distribute in the ratio 19.5 : 1 which is very different from the value 7 : 1 obtained by one who simply works it out by proportion.

Now what is the moral of this for the student and teacher of physics? After much less than 35 years of teaching I think it is this, that the quantitative side of physics is being much too greatly over-emphasized in the elementary, especially in the introductory liberal arts, course. I hasten to admit my own guilt and to apologize to former students, one and all, if such abasement will help to make my point.

Of course it is a great thing that physical science is so quantitative and that mathematical analysis applied to it is so powerful. We all have heard the one about Lord Kelvin's saying that you don't understand a thing unless you can measure it. And students should try to get a glimpse of this even in the first course, although they can hardly hope to get a real appreciation of it so quickly. But there is altogether too much of the simplified formula, derivation-without-calculus stuff and that is what makes the freshman course so dreary to so many students. In the chemistry course there is hellzapoppin most of the time, but in freshman physics we omit anything violent like an explosion because it is described by non-linear equations. The subject-matter is systematically robbed of its lively vital stuff in order to fit the requirement that the science must be exhibited as a beautiful set of exercises in high-school algebra. Out go all the topics that can't be handled this way, such as friction and lubrication, or how a whistle works, or a host of other interesting topics from everyday life. And in comes a set of polite conventions to make the problem reducible to the standard of mathematics which it is vainly hoped is within the students' grasp, such as the famous "Neglect air resistance" of the traditional projectile problems. Who wants to neglect air resistance in a class of baseball, tennis, ping-pong and golf players? In order to calculate

¹ *SCIENCE*, 93: 398, 1941.

how far some ball will go in a manner contrary to the facts, but to the physics professors' satisfaction. What the students want to know is roughly, approximately, how much is air resistance, how does it arise, what about streamlining, what about the spin of the ball. Let any professor take a brief vacation from $s = (1/2)at^2 + v_0t$, etc. and tell the boys the "real dope" without formulas but with quantitative connections discussed graphically. Students wake up, eyes brighten, the boys begin to think physics means something. It gets exciting, like chemistry the day the chemistry professor made a big explosion and a lot of red fire right on the lecture table.

In short, I hold the opinion that there is too much attempted mathematical treatment of physics in the beginning course, with resultant cutting out of interesting qualitative descriptions of phenomena, and artificial over-simplifications which make the subject obviously unreal, in order to bring it to the painfully low level of mathematical attainment of college freshmen. The remedy, obviously, is to resume the teaching of mathematics in the secondary schools.

E. U. CONDON

WESTINGHOUSE RESEARCH LABORATORIES,
EAST PITTSBURGH, PENNA.

INCOMPLETE FILES OF CURRENT PERIODICALS IN AMERICAN LIBRARIES

A LETTER¹ from Dr. Stuart Mudd emphasizes the inevitable breaks in continuity of files of American scientific journals in foreign libraries and makes a plea for the preservation of copies in this country to complete these files, when and if foreign libraries can resume their acquisitioning.

Dr. Mudd's plea is admirable. There is need of equal emphasis on the preservation of the continuity of files of foreign journals in American libraries. Unfortunately, shipments are being lost. In several cases at least, ships carrying nearly all the copies of certain issues of European publications destined for American libraries have gone down. Some American libraries have already discovered that issues lost at sea can not be replaced by the publishers. Few, if any, libraries have been able to obtain complete files of foreign periodicals for 1940. Some libraries have arranged for storage in Europe. How far such storage is a safe means of temporary preservation is not yet known.

The outlook may be far worse after the war. English and Canadian libraries, in general, have cancelled subscriptions to German periodicals. These libraries will certainly be eager to complete their files after the war, but it is probable that no copies can be found. Most publishers, both in Germany and the United States, are printing only enough copies to meet the demands of their subscribers. It will probably be

¹ SCIENCE, April 18, 1941, 93: 376.

quite impossible for all libraries which desire complete sets of German scientific publications of the war period to obtain them after the war.

The fact that many colleges have failed to receive European journals regularly has already proved a hindrance to research. It is very desirable that subscribers who have personal subscriptions to scientific journals and others who have received exchange copies preserve these numbers very carefully. They may be of inestimable value in future years.

The Iowa State College Library has not yet completed all its 1917-18 files of French and German scientific journals. Even the completion of the outstanding *Mathematische Annalen* for 1917 and 1918 was impossible until 1930. Many hindrances to research through lacunae in 1940 periodicals are arising, and the end is not yet.

CHARLES H. BROWN

IOWA STATE COLLEGE LIBRARY

THE CONTINUITY OF THE SCIENTIFIC RECORD

WE should indeed, as Dr. Stuart Mudd suggests, keep the written record of scientists' research unbroken, not only in this country but abroad. The destruction of scientific libraries now taking place in the warring countries must be remedied in the days of peace that must eventually follow. Since the first World War there has been introduced upon the scientific scene a new technique, which makes this possible at relatively low cost. This is microfilming, already in use in this country to take from library shelves to the work desk of the scholar or scientist the particular item of literature he wishes, when he wishes it. In the same way, in condensed form, and upon relatively imperishable photographic film, long runs of scientific journals can be provided at a cost comparably equivalent to the original single copy cost. Provided the original copy is available, this can be done in small editions, even as single copies, at the time when the material is needed.

There should, however, in these trying times be clear thinking and decisive action, as Dr. Mudd suggests, so that when the dead hand of war is lifted, science in freedom may continue.

WATSON DAVIS

SCIENCE SERVICE,
WASHINGTON, D. C.

THE UNIVERSITY OF HAVANA SUMMER SCHOOL

I HAVE recently received a notice of the first summer courses to be given by the University of Havana and it gives me pleasure to call attention to the unusual opportunity which is offered for the first time to American naturalists.

¹ SCIENCE, 93: 376, April 18, 1941.

Course 309.—Cuban Ornithology. Professor Abelardo Moreno. 3 hours a week (in English). Museum and field work.

Native birds: their classification and description; their behavior, song, nesting, habitat, etc. Migratory birds: periods and conditions of migration. Birds of economic importance. Extinct species. Bird protection.

Course 310.—Cuban Ichthyology. Professor L. Howell. 3 hours a week (in English). Museum and field work.

A practical study of Cuban fish; their geographical distribution in the Antilles; their relations to the North

American fauna; their commercial application. Field trips will be taken to fisheries, packing houses and for the collecting of Cuban species.

These two courses are in the hands of extraordinarily competent and attractive naturalists, and I can assure students who may be interested in the fauna of Cuba that they have an unusual opportunity should they be able to take advantage of being in Havana from July 21 to the last of August.

THOMAS BARBOUR

SCIENTIFIC BOOKS

STATISTICAL METHODS

Statistical Procedures and their Mathematical Bases.

By CHARLES C. PETERS and WALTER R. VAN VOORHIS. 13 + 516 pp. New York: McGraw-Hill. 1940. \$4.50.

DURING the last few years many books have been written on elementary statistical methods and their application. They have been written by authors in widely different fields such as agronomy, biology, psychology and economics. The books cover essentially the same body of principles, their main differences being in the examples and illustrative material included. The majority of these books can almost be characterized as manuals for the routine application of the methods which are treated. In the opinion of the reviewer, authors of these books, with a few exceptions, fail to present a logical and systematic development of the methods from first principles, which would enable the reader to get a unified view of statistical methodology. Emphasis is placed on routine application at the expense of a proper presentation of assumptions and underlying principles. The result is that the reader often applies the methods incorrectly. He also gets the impression that the subject of statistics is an aggregate of procedures and applications of formulas which should be accepted authoritatively without necessarily understanding them.

This book is an improvement over the usual run of elementary applied statistics books, in that the authors have concerned themselves more than the average author with the statement of assumptions and the systematic derivation of procedures and formulas from the assumptions. The book, however, is by no means self-contained as far as derivations are concerned. In the cases of the more involved derivations references to the literature are given. The book is a joint enterprise of a mathematician and an educational research man. It is a revised and enlarged version of a lithographed edition of a book of the same name issued in 1935. The examples and illustrative material used in the book are taken mainly from the field of educational

psychology. The normal probability table, Fisher's t and z tables and other commonly used statistical tables are given at the end. Except for a chapter on the rudiments of calculus and chapters on some of the newer statistical techniques such as factor analysis, analysis of variance and controlled experimentation, the book is very similar in many respects to T. L. Kelley's "Statistical Method" (1923), particularly in its subject-matter and manner of presentation.

In their treatment of the classical topics such as measurement of central tendency and variability, correlation theory, sampling variability, etc., the authors have done a commendable job; however, in the chapters on factor analysis and analysis of variance they tended to lapse into a presentation of a routine procedure without giving a full discussion of underlying assumptions. The attention given to probability theory can hardly be regarded as adequate. The introduction of more discussion on probability theory and its application to mean values would have enabled the authors to derive some of their sampling variance formulas with much greater elegance.

Students and teachers in psychology and other branches of social science who are interested in obtaining a little more insight into statistical methods than can be obtained in the average elementary statistics book should find this book quite useful.

Statistical Methods for Medical and Biological Students. By GUNNAR DAHLBERG. 232 pp. London: George Allen and Unwin Ltd. New York: Interscience Publishers. 1940. \$2.75.

IN recent years there has been a trend toward increased use of statistical methods in various branches of medical and biological research. In this book a medical man, who is the director of the Swedish State Institute for Human Genetics and Race Biology, has apparently presented a treatment on statistical methods primarily to satisfy needs which he has met in his own experience. The result is a book which is very elementary and limited in scope and not very well written from the point of view of statistics. The

mathematical and statistical argument is rather amateurish throughout the book. Many of the modern statistical techniques such as Student's ratio, regression methods, analysis of variance and statistical estimation, used by some medical men, are not even mentioned. The distinguishing feature of the book lies in well-chosen examples and a thorough discussion of them in relation to the statistical methods actually considered in the book. The book should perhaps be useful as an introduction to statistics for those medical and biological students who have only a secondary school mathematical background and who know nothing about statistics.

Applied General Statistics. By FREDERICK E. CROXTON and DUDLEY J. COWDEN. 18+944+13 pp. New York: Prentice-Hall. 1940. \$4.00.

THIS is perhaps the most comprehensive text-book on elementary applied statistics that has ever appeared. It falls primarily in the category of "descriptive statistics," that is, it deals mainly with the practical problem of collecting, analyzing and presenting statistical data, touching very lightly and incompletely on probability theory and its application to the problem of drawing inferences from the data. The plan of the authors, followed throughout the book, is to introduce the student to the various known elementary descriptive statistical procedures and illustrate them thoroughly with applications, appealing largely to the intuition and common sense of the reader in justifying

the techniques rather than undertaking a systematic logical and mathematical discussion of the assumptions and principles underlying them. The book is written primarily for social science students, particularly those of business and economics, with very little mathematical background. Applications of the techniques are made on many well-chosen examples taken from economics, business, sociology and industry. Some idea of the extent to which the methods have been illustrated can be gained from the fact that there are 180 tables and 257 charts in the book. The fundamental concepts and mathematics involved in these methods have not, in the opinion of the reviewer, received adequate attention from the authors, although derivations of some of the simpler formulas have been given in an appendix. The normal probability function, Fisher's t and z , Snedecor's F and other commonly used statistical tables are included in appendices at the end of the book. A highly detailed index is given.

The authors have been rather complete in their coverage of elementary descriptive statistical methods commonly used in economics, business and sociology. Teachers of introductory statistics courses in these fields who have to handle students with sketchy mathematical background should find this book well suited to their needs. Many of the research investigators in these fields should find the book useful in increasing the objectivity of their own work.

S. S. WILKS

PRINCETON UNIVERSITY

REPORTS

PURE AND APPLIED SCIENCE RESEARCH AT MELLON INSTITUTE, 1940-41

THE thirtieth anniversary of the operation of Mellon Institute's research procedure in collaboration with the University of Pittsburgh was marked by the extension of the range of activities to broad service in national defense. The present emergency has induced much more investigation on problems having important relations to the country's future welfare. Ninety-three industrial fellowships, of which 32 are multiple and 61 individual, have been at work in the institute during its fiscal year, March 1, 1940, to March 1, 1941. These investigations have employed 187 fellows and 114 fellowship assistants. During this fiscal year the institute has spent \$1,258,866 in conducting these research programs and its comprehensive studies in pure science, which have been assuming more and more professional and public importance, according to the twenty-eighth annual report of the director, Dr. E. R. Weidlein, to the trustees of the institution.

Chemical, bacteriological and clinical investigations

on the chemotherapy of pneumonia have been continued vigorously in the institute's department of research in pure chemistry in cooperation with a staff of medical associates at Mercy Hospital in Pittsburgh. From a chemical point of view the main emphasis, as heretofore, has been in the field of modified cinchona alkaloids. Methods of introducing thiol groups, at desired positions in the cinchona molecule, have been devised, and a study of such sulfur analogs of apocupreine, quinine and alkyl and hydroxyalkyl ethers is in progress. A variety of sulfonic acid derivatives of the alkaloids have been made and tested for action on the pneumococcus. Much work has been done in the cinchonidine series. Monographs are being made ready for release on the chemotherapy of malaria and on structure and antipneumococcal activity in the cinchona series. In a series of cases of pneumonia treated during 1939-40 there was found practically an equal mortality in the treatment with hydroxyethylapocupreine and with sulfapyridine. The results of treatment of 494 pneumonia cases by hydroxyethylapocupreine in the period 1935-40 have shown a marked lowering of

the total mortality and of the mortality in both the bacteremic and the non-bacteremic cases.

Under subsidy of the institute, at The Western Pennsylvania Hospital, researches have been carried forward in other phases of chemotherapy, in natural resistance factors in pneumococcal infection and the common cold, and in basic bacteriological experimentation bearing on chemotherapeutic procedure. Sulfathiazole has been found efficacious in 431 cases of varied infections. Further investigation of natural resistance has had to do with the effect of carbonic anhydrase on changes in warming time reactions and with the use of carbon dioxide inhalations in the treatment of subacute rheumatoid arthritis. The findings so far suggest that carbon dioxide impoverishment may well be a factor in the development and progress of this disease.

Another pure research project of the institute is concerned with the establishment of pharmacopoeial standards for surgical dressings and for gut and silk sutures. Standards for purified absorbent cotton have been revised, and standards are being proposed for absorbent gauze and roller bandages and for adhesive absorbent compresses employed as first-aid dressings. Standard diameters and tensile strength requirements for boilable and non-boilable gut sutures are under revision, and standard gages and strengths for silk sutures are being worked out.

During the year the nutrition fellowship of The Buhl Foundation terminated its five-year program of fundamental research on the relation of foods to dental caries. The conclusion has been reached that pre-eruptive influences are dominant in the subsequent susceptibility of rat teeth to caries. It has been suggested in fact that caries-resistant teeth can be produced by pre-eruptive nutrition. Fluorine plays a prominent part in such caries prevention and according to available data exerts its action by modification of enamel structure. It has been proposed that caries can largely be prevented by the pre-eruptive use of fluorides, but supporting data from human caries are needed before such a practice can be defined for introduction.

Air Hygiene Foundation, a non-profit organization for the conservation of employee health in the industries, whose headquarters are at the institute, is concentrating its efforts on industrial health defense along a wide front, namely: revision of its programs of medical and engineering research to stress projects of more immediate benefit in the national emergency; more attention to chemical hygiene with its multiplying problems arising from the rapid introduction of new industrial solvents and other essential compounds; initiation of a study of sick absenteeism in industry, seeking to help reduce the great losses to labor and

management suffered from this cause; and expansion of plant surveys for member companies to combat occupational hazards which augment with increased production. Foundation researches have proceeded at the Harvard School of Public Health on particle size in relation to silicosis, on gases and fumes evolved in arc welding with coated rods, and on hood design for tanks. The foundation also supports investigations at The Saranac Laboratory and the University of Pennsylvania. It continued the issuance of the monthly *Digest of Industrial Hygiene*, published the proceedings of the fifth annual meeting, and started a series of bulletins on "Industrial Health Defense."

The pearl fellowship, which has given a physico-chemical basis to margaritology, perfected a radiographic method for showing the structural differences of cultured and natural pearls. The fellowship on laboratory constructional materials evolved an entirely new ceramic body possessing properties required for table-top service. The multiple fellowship on refractories announced new testing procedures for the pyrometric cone equivalent of clays and for the consistency of mortars; it has been studying the action of slag on refractories and has aided in developing methods for measuring brick and shapes for size and warpage. The fellowship on graphite improved methods of manufacturing crucibles. The multiple fellowship on heat insulation is carrying on investigations on the effects of chemical composition and physical characteristics on the rate of heat transmission through various insulating materials and on preventing the penetration of water vapor into insulation used at sub-zero temperatures.

The multiple fellowship on protected metals demonstrated that the cupriferous cement Hubbellite is permanently self-sanitizing in a practical way and will not give rise to sparks where used in floors. The mineral products fellowship expanded the utilization of Garspar into the sanitary ware and wall-tile fields, showed its value in nodulated glass batches, and found that Garcolite, another special silica product, improves portland cement mixtures. The fellowship on optical glass devised procedures of chemical treatment to increase the transparency of polished glass surfaces and to raise the durability of optical glass. The ceramic chemicals fellowship is adapting the Hommelaya process to the enameling of hollow ware. The multiple fellowship on plastic metals is developing equipment for the production of electrolytic iron powder and melting stock. The acid recovery fellowship made notable advances in treating waste pickle liquor. The fellowship on metal-working contrived an automatic continuous method of pickling and galvanizing cylindrical vessels. The multiple fellowship on sulfur began research on the behavior of olefins with sulfur.

The investigation of the major problem of the gas purification fellowship, the removal of organic sulfur from coke-oven gas, has been advanced to the pilot-plant stage. The work of the gas byproducts fellowship has led to a new series of pigments and to novel inhibitors from ammonium thiocyanate. The tar-distillation fellowship has been engaged in separating paraffins and naphthenes from the otherwise pure aromatics from light oil. The multiple fellowship on tar treatment has effected a new separation of the constituents of anthracene cake and is looking for uses for the recovered carbazole and phenanthrene. The multiple fellowship on tar synthetics is engaged in upgrading byproducts of the coking process by employment of high-pressure catalytic techniques. The multiple fellowship on natural gas began comprehensive research on the fractionation of various liquid hydrocarbon mixtures. The multiple fellowship on petroleum moved forward in the study of micro-analytical methods for examining petroleum products, in research on fractionation in vacuum, and in investigations of desulfurization and of engine deposits. The oil cleaner fellowship has been studying the basic principles involved in the removal of solid sludge by mechanical straining action. The fellowship on watch technology completed its development of new lubricants especially valuable for watches, clocks, meters, and instruments requiring lubricating agents that will remain effectual under conditions where a continued delivery of lubricant can not be readily provided.

The multiple fellowship on organic synthesis, 27 years of age, accomplished advances in researches on hydraulic fluids, gas purification and dehydration, surface-active compounds, synthetic coatings, and textile lubricants. The multiple fellowship on chemical hygiene devoted most time to the investigation of actual industrial hazards, such as skin contact and vapor inhalation, from newly synthesized organic compounds. The iodine fellowship found that powdered potassium iodide could be given stability by a water-proof coating of calcium or magnesium stearate, greatly reducing the loss of iodine from iodized salt and feeds. The multiple fellowship on food varieties announced several novel foods and results on the availability of calcium in strained foods. The multiple fellowship on meat merchandising described 15 new Tenderay plants and also improved commercial practice in this process of tendering edible flesh. The Sterilamp fellowship learned that ultra-violet radiation of the wave-length 2537 Å markedly reduces any initial surface contamination where applied to freshly produced foods, lengthening the storage life of these comestibles.

The multiple fellowship of the Cotton Research Foundation made excellent progress in increasing cot-

ton tire cord strength and flex-life, in using cotton lint, linters, and cottonseed hull fibers in paper making, in preparing cottonseed proteins and activated carbons, and in evaluating the nutritive properties of cottonseed meal and its constituents. The multiple fellowship on garments has discovered that increased wear performance of fabrics can be attained through selected weaving conditions and has evolved processes for fusing fabrics that are in successful industrial employment. The textile finishing fellowship introduced Onyxsan, a new type of cationic finishing agent for rayon fabrics, a mixture of high molecular weight imidazoline salts, now in use on about one third of the total rayon production of the United States. The multiple fellowship on commodity standards is determining the degree of usefulness of various kinds of informative labels as to both their merchandise selling power and their value to the public.

The Gartex fellowship made advances in investigating problems connected with the production of the processed silica known as Gartex and its utility as a filler in the rubber, paint, and resin industries. The Raolin fellowship carried into commercial production its accomplishments along new lines in the field of chlorinated rubber manufacture and applications. The multiple fellowship on protective coatings investigated the effect of variations in relative humidity upon the incipient corrosion of ferrous metals under continuous resin films and also studied the kinetics of resin formation and degradation. The meter fellowship evolved a special laminated phenolic-type water-meter disc for continuous use at boiling temperature and has under development other new types of plastics for employment in water meters at medium and high temperatures and for application in gas-meter diaphragms.

Eight industrial fellowships began their researches during the fiscal year: foundry practice, leather reclamation, lignin, nacre, petrolatum, phenol chemistry, powder metallurgy techniques, and sugar chemistry. Three other new fellowships have been accepted and will start their programs before long. Seven fellowships concluded their investigations during 1940-41.

During the calendar year 1940, a new periodical (*Nutritional Observatory*), 12 bulletins, 25 research reports, and 41 other papers were published. The total contributions to the literature for the thirty years ended December 31, 1940, have been 18 books, 153 bulletins, and 1,800 articles. Forty-six United States patents and 30 foreign patents on fellowship inventions were issued in 1940; 801 United States patents and 841 foreign patents have been granted since 1911.

W. A. HAMOR

MELLON INSTITUTE OF INDUSTRIAL RESEARCH,
UNIVERSITY OF PITTSBURGH

SPECIAL ARTICLES

AGE SUSCEPTIBILITY OF DUCKS TO THE VIRUS OF THE ROUS SARCOMA AND VARIATION OF THE VIRUS IN THE DUCK¹

THE duck so far considered as a resistant species² can be infected with the Rous virus as long as two conditions are fulfilled: (a) that newborn individuals are injected, preferably by the intravenous route; (b) that large amounts of virus are used. So far, it has not been possible to infect Pekin ducks older than one day with any dose of virus or newborn ducklings with amounts of virus lower than 4 cc of filtered or 2 cc of non-filtered extract of tumor at 1:20 dilution.

The intravenous infection of the duckling by the Rous virus manifests itself in two ways: (a) Development of a hemorrhagic disease, fatal within a few weeks with blood blebs and extravasations in viscera much as in newborn chicks similarly infected with the virus.³ As in the latter host, the hemorrhagic lesions both grossly and microscopically are or are not accompanied by tumor formation. (b) Development of one or a few sarcomata in varied locations several weeks or even months after injection when the bird is full grown. These two sorts of results have also been obtained when newborn ducklings were injected in the breast with large amounts of tumor filtrates, but not enough to induce local growths: blebs or tumors were found in viscera when the birds died or were killed several weeks or months later.

Once tumors have been induced in ducks by the chicken virus, the disease can easily be transmitted by grafts or filtrates to other ducks without much regard for the age of the host. The disease in the duck injected in the vein with the passage virus is characterized by the development of wide-spread tumors, mostly in the skin and digestive tract, but also in the skull, ribs and muscles, and less frequently in other locations. If cells are grafted, then rapidly growing local tumors develop, and if the host lives long enough the same wide-spread disease results as when filtrates are injected in the vein. Either after vein injections or after grafting there develop hemorrhagic lesions accompanied or not by tumor cells, and its incidence as well as that of generalized tumors is in an inverse relation with the age of the host. Tumors in the duck are typical in many respects and can easily be distinguished from the original chicken tumor.

But in the same way that the virus has acquired this capacity to infect ducks, it has lost its original one to

infect adult chickens, as shown by many experiments where extract of the duck-passed virus was injected in large amounts into these hosts. Apparently, this change takes place suddenly as soon as the chicken virus has infected the duck cells, for extracts of hemorrhagic and neoplastic lesions from ducks infected with the original Rous virus have consistently failed to induce tumors in adult chickens. Also injection of large amounts of duck tumor cells into chickens resulted either in no tumors or in tumors that regressed after an initial period of growth. Three of such chickens reinjected with cells and two with filtrates of the original Rous tumor proved to be as susceptible as normal controls.

Identical phenomena were observed after the chicken tumor was passed through eight generations of ducks by means of cell suspensions. In the course of these experiments the observations of Purdy² concerning the age susceptibility of ducks to Rous tumor cells were amply confirmed. Therefore, whatever the defensive forces of the host are, they work equally well against both the causative virus and the result of its action, the malignant cell.

When young chicks are injected intravenously with the duck variant of the Rous virus, they develop a disease which is wholly different from that induced in these hosts by the original Rous virus similarly injected.³ All of 20 chicks from 1 to 3 days old injected intravenously with filtrates of duck tumors from the 4th and 6th virus passage died in from 20 to 40 days of a condition characterized by the development of multiple sarcomata mostly in both flat and long bones, but also in skeletal muscles, and only occasionally in viscera. The bone tumors proved to arise from the periosteum and endosteum, and rapidly invaded the marrow cavity. In the non-invaded part pronounced non-malignant formation of new bone was the rule.⁴ Analogous results have been obtained with the duck virus at its 9th and 13th passage with the difference that the incidence of tumors induced has so far been very low, and then they were not manifest until from 50 to 100 days after the injection. Filtrates or cell suspensions of the periosteal tumors injected into the vein or breast of young ducks have induced the typical duck disease, and if injected into chicks and pullets have reproduced the osteo-muscular disease in 3 successive passages.

In conclusion, it has been shown that a virus inducing sarcoma in one species (chicken), can infect another species (duck) if injected within a short period after birth, and sarcomata resulting from this infec-

¹ This investigation was aided by a grant from The Jane Coffin Childs Memorial Fund for Medical Research.

² W. J. Purdy, *Brit. Jour. Exp. Path.*, 13: 473, 1932.

³ F. Duran-Reynals, *Yale Jour. Biol. and Med.*, 13: 61 and 77, 1940; F. Duran-Reynals and E. Estrada, *Proc. Soc. Exp. Biol. and Med.*, 45: 367, 1940.

⁴ Histological study of these tumors as well as of other lesions in chicks and ducks was carried out by Dr. Henry Bunting.

tion may not be noticeable until later in life when the animal has almost attained maturity. The infection is attended by a sudden variation⁵ in the virus manifesting itself by its inability to infect adult individuals of the original species; by the sort of cells attacked and characteristics of resultant tumors in the new species; and possibly by changes in its antigenic make-up. Duplicating the same sequence but in an inverse order, infection of the original species by the virus variant is only accomplished in the very young individual, which weeks or months later may develop a neoplastic disease radically different from that induced in it by the original virus. But this back infection is not attended by any other obvious variation in the virus which now attacks young individuals of both species.

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INOSITOL AND SPECTACLED EYE IN RATS

IN the biological assay for vitamin B₆ employing the diet of Halliday and Evans,¹ it was observed that denudation around the eyes could be induced in almost 100 per cent. of the fifteen animals when nicotinic acid was given at weaning in addition to thiamin, flavin, pantothenic acid and choline. This syndrome was similar to that reported by Oleson, Bird, Elvehjem and Hart,² except that the spectacled eye was not complicated by the exudation and final closure which Unna³ reports could be cured by pantothenic acid.

Apparently the spectacled eye, as previously reported by other workers, is a multiple deficiency requiring at least two factors, one of which is pantothenic acid and the other a factor concerned in the growth of hair.

It is known that filtrate factor concentrates of liver, yeast and cereal grains can cure both the denudation around the eyes as well as the exudation condition. Since the true spectacled eye might be thought of as a type of alopecia, and since Woolley⁴ has shown the mouse alopecia factor to be inositol, this compound was fed to rats in an attempt to cure the spectacled eye as produced under our conditions. 10 mg of Eastman's inositol were administered per rat per day. The results were quite dramatic. The swelling around the eyes disappeared within 24 hours and in three days definite signs of hair restoration were evident. By 10 to 14 days the halo around the eyes was com-

⁵ The word *mutation* is purposely avoided until an agreement is reached as to whether or not it is permissible to use it in fields other than genetics.

¹ N. Halliday and H. M. Evans, *Jour. Nutrition*, 14: 45, 1937.

² J. J. Oleson, H. R. Bird, C. A. Elvehjem and E. B. Hart, *Jour. Biol. Chem.*, 127: 23, 1939.

³ K. Unna, *Jour. Nutrition*, 20: 565, 1940.

⁴ D. W. Woolley, *SCIENCE*, 92: 384, 1940.

pletely overgrown with hair and the rats could not be distinguished in this respect from normal animals.

In harmony with Woolley's⁴ report, a definite response in growth accompanied the above changes. On the Halliday and Evans diet supplemented with crystalline thiamin, flavin, nicotinic acid, pantothenic acid, pyridoxin and choline, these control animals showed an average weekly gain of 10 grams. When 10 mg of inositol were given in addition, the average weekly gain was 15 grams.

We believe the evidence demonstrates inositol to be the factor concerned with the regeneration of hair in the condition referred to as "spectacled eye" in rats. In addition, inositol has been shown to have a function in the growth of the rat.

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THE DEVELOPMENT OF EARLY MOUSE EMBRYOS IN THE EXTRAEMBRYONIC COELOM OF THE CHICK¹

IN preparation for an experimental study of the development of certain hereditary abnormalities affecting early embryonic stages in mice, a new method for cultivating entire early mouse embryos has been developed. Mouse embryos at the ages of 7 to 8 days, i.e., egg cylinder to six somite stages, were removed from the uterus within their decidua and transferred into warm sterile Ringer's solution. They were then dissected out of the decidua and Reichert's membrane was pulled off the egg cylinder. For the transplantation of stages older than the egg cylinder all membranes were removed from the embryo as completely as possible. The embryos were transplanted into 72 to 80-hour chick embryos in such a way that they came to lie in the extraembryonic coelom. A window was cut into the egg shell, then a slit was made into the vitelline membrane and the serosa; the mouse embryo was transferred onto the membranes with a Spemann pipette and pushed through the slits into the extraembryonic coelom next to the allantois with the help of glass needles.

At examination after 24 or 48 or 75 hours the mouse embryos may be found floating freely in the extraembryonic coelom, or attached to any of the extraembryonic membranes; in some instances they are attached to the allantoic stalk. Some operations were performed in which the mouse embryo was pushed partly into the coelom at the place of open communication between intraembryonic and extraembryonic coelom next to the allantoic stalk. Such embryos con-

¹ These studies were aided by a grant to Professor L. C. Dunn from the Fund for Research of Columbia University and from the Josiah Macy, Jr., Foundation.

continued their development at the site of implantation, partly in the intraembryonic, partly in the extraembryonic coelom; this location was found to be especially suitable for the further development of the mouse embryos. Fourteen primitive streak stages (7 days) transplanted to the chick by the methods described above developed within 48 hours into typical day embryos which were smaller than normal but looked fairly normal, at least externally. However, disturbance of the size relationship of the different organs was noticed. The embryos were enclosed in their amnion, had six pairs of somites, a strongly and normally beating heart, cerebral lobes which were well developed but relatively smaller than normal, an irregular slightly winding neural tube and a tail bud. Other embryos, implanted into the extraembryonic coelom in the first somite stages (age about 8 days), continued development up to the stage when maternal circulation becomes of primary importance for the nutrition of the embryos, i.e., at 9 to 10 days. Fur-

ther experiments will have to show whether it will be possible to obtain any development beyond these stages. By observing aseptic precautions, the operations can be made to work successfully without great difficulties in a large percentage of cases.

Thus a method for extended study of post-implantation stages of mammals has been developed which will supplement those already made available by Nicholas and Rudnick² and by Törö³ for rats, and Waddington and Waterman⁴ for rabbits.

The author wishes to express her gratitude to Dr. L. C. Dunn for his suggestions and his encouragement and to Drs. J. S. Nicholas and D. Rudnick for their help and instruction and their hospitality while the method was being worked out during a four weeks' stay at the Osborn Zoological Laboratory of Yale University.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN APPARATUS FOR CONTINUOUS, RAPID AND COMPLETE EXTRACTION OF ESTROGENS

MANY continuous extraction apparatus have been developed for use in estrogen determinations.^{1,2,3} In a series of clinical studies now in progress, where multiple determinations are required, we designed an extractor which permits small quantities of liquid to be rapidly extracted as a part of a routine in this series of analyses.

The apparatus schematically illustrated consists of several separate units which are connected by standard ground glass joints. These are boiling flask (B), condensing unit and extractor (A), which includes an inlet and outlet to facilitate operation, and a stirring device to increase extracting efficiency.

In flask A is placed the solution to be extracted to a level about 2 cms below the opening into tube (a). In flask B is the extracting solvent which is of a lower specific gravity. When heat is applied to flask B vapors developed go up (b) are condensed, and dropped down through tube (c) to pass out at the bottom of flask A through perforated bulb (d). The stirrer mixes the two liquids into a temporary suspension without disturbing the layers formed at the top. The lighter liquid collects at the top until the hydraulic

head built up in (c) is sufficient to cause siphonation at tube (a) into flask B. From here the whole process repeats itself, continuously. The apparatus is filled through a funnel (D) and at the end of the operation is emptied through the stop-cock (e) opening at the base of flask A.

The inclusion of the stirring device increases extracting efficiency by bringing more liquid into contact with extracting solvent. The inlet funnel (B) and outlet stop-cock (e) permit filling, separation of layers and emptying without loss of time and danger of breakage in disengaging at the start or conclusion of an operation. This also facilitates cleaning of the apparatus.

This extractor can be adapted for large quantities by substituting a larger extraction flask of relative proportions. The advantage of the stirrer in a larger apparatus becomes more apparent as the peripheral liquid which would ordinarily not be touched by the extracting solvent is brought into direct contact due to stirring action.

Several tests on the efficiency of the apparatus have been made. Specimens used were estrone—estradiol fractions (obtained according to the method of Smith and Smith, 1939, from three separate pooled pregnancy urines, each divided into equal aliquot portions as labeled in Table 1).

¹ T. F. Gallagher, F. C. Koch and R. I. Dorfman, *Proc. Soc. Exp. Biol. and Med.*, 33: 440, 1935.

² O. W. Smith, G. Van S. Smith and S. Schiller, *Endocrinology*, 25: 509, 1939.

³ N. B. Talbot and G. O. Langsroth, *Endocrinology*, 25: 29, 1939.

⁴ J. S. Nicholas and Dorothea Rudnick, *P.N.A.S.*, 20: 656-658, 1934; *Jour. Exp. Zool.*, 78: 205-232, 1938.

⁵ Emeric Törö, *Jour. Exp. Zool.*, 79: 213-236, 1938.

⁶ C. H. Waddington and A. J. Waterman, *Jour. Anat.*, 67: 355-370, 1933.

TABLE 1

Purpose of experiment	Specimen identification	Time of extraction	Bio-assay* γ/cc of extract
Reproducibility of results	P.U. 1A	6 hrs.	63
	P.U. 1B	6 "	63
Time of complete extraction	P.U. 2	24 "	42
	P.U. 2A	4 "	42
	P.U. 2B	8 "	42
	P.U. 2C	16 "	42
	P.U. 3AI.	4 "	42
	P.U. 3AII.	2 "	28
	P.U. 3AV.	1 "	28

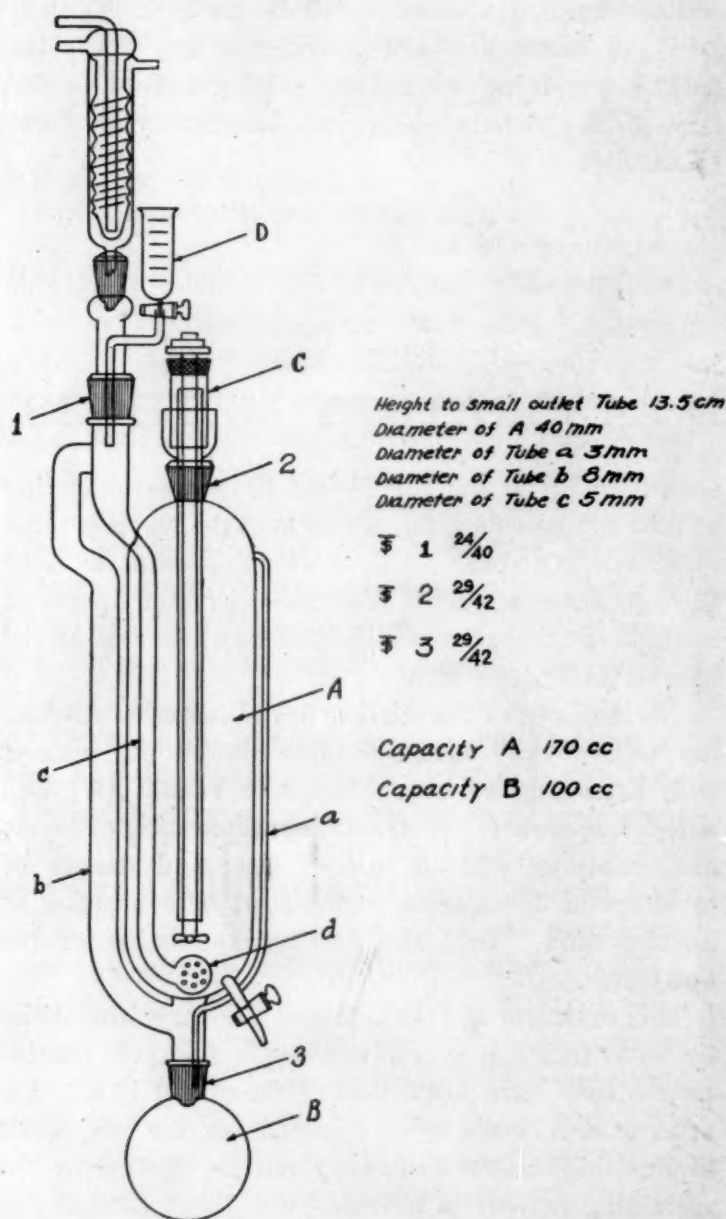
* Rat Unit = $1\frac{1}{4}$ γ estrone

FIG. 1

Results indicate both reproducibility and relatively great efficiency.

This apparatus has given complete extraction of identical quantities requiring less time than with the use of other extractors.

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OBTAINING BLOOD FROM MICE

WHILE testing the sera of individual mice for antibodies several years ago, the writer obtained blood more easily and in larger quantities by severing the axillary artery than by cardiac puncture. Since a number of papers have appeared recently in which the investigators reported using cardiac puncture in bleeding mice, the method employed by the writer is hereby described with the hope that it will be useful to others.

The mouse is anesthetized, placed on its back on a dissecting board and its extended legs fastened with spring clips. The hair is thoroughly moistened and with scissors, a mid-line incision is made through the skin from the abdomen to the neck. The skin of the right side is grasped with small hemostatic forceps and reflected by pulling until the muscles of the right foreleg are exposed. A pocket will be formed between the skin and body wall in the axilla. When the mouse shows signs of regaining consciousness, the axillary artery is severed by cutting deeply with sterile scissors through the center of the pectoral muscle into the axilla. A pool of blood immediately forms in the pocket and can be removed easily with a sterile pipette. A greater yield is obtained if the mouse almost recovers from the anesthesia before the artery is severed than if it is cut during deep anesthesia. The bleeding is so profuse that the animal rapidly loses consciousness. This method also has been used successfully on rats and may be useful in bleeding small birds.

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BOOKS RECEIVED

- BEAUCHAMP, WILBUR L., JOHN C. MAYFIELD and JOE L. WEST. *A Study-book for Science Problems 3*. Pp. 316. Scott, Foresman. \$0.76.
- DAVIS, HAROLD T. *The Theory of Econometrics*. Pp. xiv + 482. Principia Press.
- ELLINGER, FRIEDRICH. *The Biologic Fundamentals of Radiation Therapy; a Textbook*. Translated from the German by REUBEN GROSS. Pp. xvi + 360. 79 figures. Nordemann. \$5.00.
- HAWLEY, FLORENCE. *Tree-ring Analysis and Dating in the Mississippi Drainage*. Pp. xi + 110. 8 plates. University of Chicago Press. \$1.50.
- LUCK, JAMES M., Editor. *Annual Review of Physiology Vol. III, 1941*. Pp. 784. American Physiological Society and Annual Reviews. \$5.00.
- Revista; Serie A, *Matematicas y Fisica Teorica*. Vol. 1, Nos. 1 and 2. Pp. 334. Universidad Nacional de Tucuman, Argentina.
- SHULL, A. FRANKLIN. *Principles of Animal Biology*. Fifth edition, revised. Pp. xiv + 417. 298 figures. McGraw-Hill. \$3.50.
- WINTNER, AUREL. *The Analytical Foundations of Celestial Mechanics*. Pp. xii + 448. Princeton University Press. \$6.00.
- Woods Hole Oceanographic Institution. *Collected prints, 1940*. Illustrated. The Institution.